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PUBLIC HEALTH ABSTRACTS AND REVIEWS

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HEALTH IS A STATE OF COMPLETE PHYSICAL, MENTAL, AND SOCIAL WELLBEING AND NOT MERELY THE ABSENCE OF DISEASE OR INFIRMITY

— *WORLD HEALTH ORGANISATION*

Vol. III, No. 1 March 1956

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PUBLIC HEALTH ABSTRACTS AND REVIEWS.

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A NATIONAL PROGRAMME FOR THE CONTROL OF VENEREAL DISEASES

BY

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[From "Indian Journal of Venereal Diseases and Dermatology," Vol. 21, No. 1, pages 29-36.]

Introduction.

While we have a national plan for other communicable diseases like malaria, tuberculosis, leprosy, filariasis, the problem of venereal diseases has not received the attention which it deserves. The World Health Organization assigned the third place to venereal disease, next to malaria and tuberculosis in communicable disease priorities. There is an unjustifiable complacency among the public, the medical profession and even medical administrators regarding the importance and urgency of the problem. The 'dying Syphiologist', the expiring Urologist' are some of the expressions used by the unthinking among the medical profession. Since the advent of penicillin, it is true that from the point of view of the individual sufferer, gonorrhœa can be cured in a few days and syphilis in two weeks. But these diseases with a communitywide distribution cannot be controlled or combated on the basis of individual treatment of persons who voluntarily seek treatment at a public clinic or from private physicians.

Among the group of venereal diseases, syphilis offers a challenge to the health administrator and constitutes a major health hazard to the individual and the community.

In no other communicable disease, we have such effective tools of rapid diagnosis and treatment as in syphilis. By the application of certain public health techniques, it is possible to bring down the reservoir of infectious syphilis in the population. This has been amply borne out in the remarkable decline of infectious syphilis in the countries of the West since World War II.

In these countries, the national governments set up control organizations in which the therapeutic, epidemiological and educational aspects of venereal diseases, control were successfully integrated.

What is the status of Venereal Disease in the Republic of India.

To take syphilis as the major menace to health among the group of venereal diseases.—There are no accurate statistical data on the morbidity and mortality of syphilis in our country. From the limited information available on the prevalence and incidence of syphilis, based upon the attendance of patients in clinics and hospitals and limited surveys of groups of population, it would appear that syphilis next to malaria and tuberculosis is a major public health problem in our country.

Here are some facts to spot light the seriousness of the current situation—(1) Treponemal disease is prevalent in the Indian Union in three forms—(*a*) Venereal syphilis, (*b*) Endemic syphilis—venereal and non-venereal, and (*c*) Yaws.

Venereal syphilis is mostly prevalent in urban areas, cities, towns, seaports, industrial centres, and pilgrim centres. Endemic syphilis is prevalent in the primitive hill

folks inhabiting the vast sub-Himalayan area extending from Kashmir in the north-west to Assam in the north-east and also in the vast slum populations of cities. The third pattern of treponemal disease, yaws, is reported to be endemic in the valleys and hills of Assam, certain contiguous areas of the States of Andhra, Hyderabad, Madhya Pradesh and Orissa and in certain isolated enclaves of the rural areas of Madras State.

Treponematosis may be regarded as a signal example in the realm of communicable diseases, where the host parasite relationship has changed with the changing environmental and socio-economic conditions of human populations.

A synthetic view of the disease patterns —Venereal syphilis, non-venereal syphilis and yaws is justified on the following grounds :—

(*a*) Historical evolution of the disease.

(*b*) Identity in the morphology of the parasitic agent.

(*c*) Fundamental sameness of the pathological reaction of the tissues,

(*d*) Identical serological reaction,

(*e*) The existence of cross immunity between the disease syndrome,

(*f*) Response to treatment with chemo-therapeutic and antibiotic drugs.

With the increasing urbanization consequent on shifting of populations from the rural to the urban areas and the impending accelerated tempo of industralization visualized in the Second Five-Year Plan, syphilis will pose a serious and urgent problem.

(2) A perusal of the annual clinic admissions in the teaching hospitals of Madras, Bombay and Calcutta reveals that of total admissions for syphilis, 66 to 75 per cent are for early infectious syphilis while in Western clinics, early infectious syphilis forms only one-fourth or one-fifth of the total syphilis admissions.

(3) The sex ratio of early infectious syphilis patients reporting at clinics is three or four males to one female. Hence there is a large undiscovered reservoir of infection among women, who never reach hospital clinics and are spreading the infection among the population. Analysing the age specific rates among reported cases of early infectious syphilis, the greater risk of infection is in the age-group 15–30 and constitutes 80 per cent of the reported total infectious load.

(4) *Morbidity and mortality of infants born of syphilitic mothers.*—On analysis of 1,000 pregnancies sustained by 260 pregnant women with untreated syphilis, the results of the outcome of pregnancy was as follows :—

	PER CENT
Healthy non-syphilitic children ..	30
Syphilitic babies	40
Still births and neo-natal deaths ..	30

This means that seven out of ten children born to untreated syphilitic mothers are either dead born or diseased. The stigmata of congenital syphilis among those who survive are frequently sufficiently crippling to make such children costly non-productive burdens on society in later life.

There is talk about the rehabilitation of the blind, the deaf and the crippled child. In the field of preventive medicine pertaining to childhood disorders, rehabilitation is the last desperate cry of society to make up for its neglect to prevent the causes that lead to the maiming and crippling of the sweetest creation on God's earth. Pre-natal syphilis is one such preventable disorder. It is surely the basic right of an infant to be born free of syphilis.

(5) Syphilis is one of the blinding diseases both in children and adults. Routine serological screening of patients for syphilis attending the Government Opthalmic Hospital, Madras, for ocular disease for the three years 1951–53 revealed 16·1 per cent of positive reactors to syphilis and it is our surmise that about one-fifth of total blindnes in children and adults in which an infectious astiology could be established is due to neglected or undiscovered syphilis.

(6) The effect of syphilis on the cardio-vascular system is well known. From figures published from teaching hospitals, it would appear that syphilis accounts for 12 to 15 per cent of the total organic disease of the heart and blood vessels admitted for treatment. Although the late parenchymatous lesions of the nervous system caused by syphilis are not so common as in Western countries, meningeal and meningovascular syphilis particularly affecting the spinal cord occur in 3 to 5 per cent of total syphilis admissions in hospitals.

These data gathered mostly from the hospitals in the City of Madras may equally apply to the other big cities such as Bombay and Calcutta. Although these figures based upon diseased population groups seeking admissions and treatment in hospitals do not give an accurate picture of the prevalence or incidence of syphilis in the population as a whole and are subject to errors of over or under estimation, yet they should be sufficiently disturbing to our complacency and should make us sit up and take notice. The true prevalence rate of syphilis can never be determined short of blood testing of the entire population. Such a procedure is impossible and impracticable.

(7) Studies on the prevalence of syphilis among pregnant women are free of many of the objectionable selective features, inherent in population groups that come under medical care for other conditions including syphilis. Such pregnant women are not biologically selected because they are suffering from a disease but because of a natural physiological function. Pregnancy thus provides a natural physiologically selective mechanism in a relatively small segment of the general population which is fairly constant year after year in its proportional representation of the various strate of society. Hence the prevalence of syphilis in such a physiologically selected sample of the population as pregnant women offers a relatively reliable and a convenient index of the extent of syphilis infection in the community as a whole. Here are some recent figures—

Routine serological screening of 11,736 consecutive expectant mothers who attended the ante-natal clinics of the Women and Children Hospital, Madras, in 1953 revealed 6·3 per cent of positive reactors to syphilis. Among 13,609 pregnant women who attended the ant-natal clinics of the Municipal Corporation of Madras in 1952–53 the percentage of positive reactors to syphilis was 7·2. Curiously enough when we recently blood tested 159 non-pregnant women from a Women's Welfare Home in Madras, consisting of deserted wives, widows, etc., we found almost the same percentage of positive reactors—about 7·8 per cent. Prior studies at Simla Hospital, Calcutta Hospital, Singur Health Unit had shown a percentage rating of positive reactors from pregnant women routinely tested for syphilis ranging from 4 to 7·5. Hence it can be reasonably claimed that the prevalence of syphilis among apparently normal pregnant women is a measure of its prevalence among the general population. In other words, a 5 per cent prevalence rate for the whole of India may be conservative estimate of the status of syphilis among teeming populations of our country. If hospital and clinic rates for early infectious syphilis are any indication, it is reasonable to assume that there is a considerable reservoir of infectious syphilis among the population in the scale of about 3,000 to 4,000 per hundred thousand of the population in urban and semi-urban areas.

(8) Confirmation of the reliability of prevalence rates for syphilis in the general population based upon the percentage rating of positive reactors to syphilis among pregnant women is available from another apparently normal group—the voluntary blood donors. During the year ending on 31st July 1954, 5,952 voluntary blood donors attending the Blood Bank of the Government General Hospital, Madras, were

serologically tested at the laboratory of the Venereal Diseases Department and the percentage rating of positive reactors to syphilis was 5·3. An identical prevalence rate was reported from Calcutta hospitals.

Endemic Syphilis.

The World Health Organization Demonstration Team under the leadership of Dr. Cutler carried out extensive surveys of groups of hill populations in Himachal Pradesh which revealed a high prevalence rate of syphilis varying from 5 to 59 per cent. It is presumed that a similar high rate exists in other areas from Kashmir to Assam. Non-venereal acquired childhood syphilis has been recently discovered among the slum populations in the City of Madras and its environs. These populations in the 400 odd slums live under conditions of squalor, total lack of hygiene and debased sexual standards. Adult venereal syphilis, juvenile venereal syphilis, and non-venereal acquired childhood syphilis thrive cheek by jowl in this pitiable section of humanity. What is true of Madras slums must also be true of slums in other big cities of our country with a growing population.

Yaws, the third type of non-venereal treponematosis, is not a major public health problem as syphilis is in the current situation. The State Governments of Andhradesa, Hyderabad and Madhya Pradesh with the help and technical advice of World Health Organization UNICEF have launched a mass project of yaws control in the contiguous areas where yaws is endemic among the backward populations.

The other major venereal disease, gonorrhœa, has lost much of its ancient terror for the individual sufferer and may be a minor treatment problem among those who are discovered. The great problem still remains among undiscovered cases, predominantly women who are symptomless carriers of infection. It is considered by those who are in daily professional contact with the disease, that the increasing and widespread use of penicillin for a variety of other disease condition has changed the disease from a 'Hyde to Jekyl' pattern although quantitative evidence in support of this presumption is not available. Much less information is available about either the incidence or prevalence of gonorrhœa in the population. Even in countries where an efficient veneral diseases control organization has been operating for many years; the incidence of gonorrhœa has not shown any precipitous decline as that of syphilis.

We have no cost analysis and accounting of uncontrolled and undiscovered syphilis. But the economic burden of venereal diseases on the community and the state living on a substance level must be considerable

"To the physical havoc wrought by these diseases and by the conditions in which they breed must be added the social wreckage of twisted moral and ethical values, of warped and irreparable damaged lives."

What is the present situation on the control of Venereal Diseases?

Facilities for the diagnosis and treatment of syphilis and other venereal diseases exist in the larger hospitals of the cities and some of the major municipalities. But these are grossly inadequate both in quality and quantity. Except in one State of the Union, the concept of control of venereal diseases is non-existent. The treatment clinics which are operating in the hospitals are like revolving doors of department stores in which an enormous clinic load gets in and gets out and no further notice is taken. There is a sad lack of epidemiological investigation, patient education and case-finding activities.

It is my presumption that a large but unknown number of venereal disease patients are being treated by private physicians practising modern medicine, practitioners of other schools, and an army of unqualified quacks. I understand in the last

category are a few women Venerealogists who profitably combine the purveying of sex and treatment of the consequences. The standards of scientific diagnosis and treatment leave much to be desired both in the public clinics and among private practitioners. A sort of hit and miss therapy prevails in the treatment of these diseases.

At the request of the Government of India, World Health Organization sent a Venereal Disease Demonstration Team in 1949 to work side by side with a matching National Team to establish a centre for a survey and mass treatment of syphilis among the Paharis of Himachal Pradesh and also to train teams of doctors, technicians, nurses etc., in the modern methods of venereal diseases control. Fourteen teams were trained during the period of the project who were sent from different States at the instance of the Central Government and at the end of the three months training were supplied with laboratory equipment and penicillin by UNICEF to establish venereal diseases control activities in their respective States. The present status of the activities of these control teams in the different States is not known. In 1949, Dr. Leiby, a World Health Organization Consultant from the States, at request of the Central Government toured the country, visiting hospitals, venereal disease clinics, contacted Medical and Health Administrators and submitted a report for the control of venereal diseases in India.

The Central Government has recently taken steps for the manufacture of penicillin with the technical help of World Health Organization and financial aid from UNICEF. Steps have also been taken for the preparation of cardiolipin antigen at the Serological Laboratory, Calcutta. As a part of the scheme for the establishment of an All-India Medical Institute for Post-Graduate Training and Research on the recommendations of the Upgrading Committee, the Venereal Diseases Department of the Government General Hospital and Medical College, Madras, was upgraded in 1952 to serve as a central institution for the training of medical and para-medical personnel for advanced research in various aspects of venereal diseases and to serve as a model unit for demonstrating the clinical, laboratory, social and preventive aspects of venereal diseases control. The World Health Organization generously came forward to help in the implementing of the upgrading scheme with the laboratory and educational equipment, transport for epidemiological and case-finding procedures and technical personnel. Besides, the organization granted two fellowships for the medical officers of the department for training abroad. They have satisfactorily completed their fellowship training and one of them has just returned having qualified for M.P.H. of Johns Hopkins University, Baltimore.

Discussion.

There is sufficient data available to suggest that, in the larger cities and industrial areas, the prevalence of venereal diseases is disturbingly high claiming around 5 to 7 per cent of the population for syphilis alone. The majority of the victims of the disease in these populations belong to ignorant underprivileged sections. The problem in the rural areas is not defined, although it is usual to quote Sir John Megaw's of 3·7 per cent for India's agricultural population based upon the unreliable replies to questionnaire sent to dispensary doctors in villages. The preventive bias in the current medical education is sadly lacking. " Much will have to be accomplished by medical educationists before the satisfaction the average physician finds in his direct relation to his patient can be replaced by his satisfaction in his service to the community as a whole." " Permanent improvement in a nation's health cannot be secured by clinical medicine alone ". In the memorable words of Prof. J. M. Mackintosh, " Sickness is an incident—grave or troublesome in the life of

a person but to the hospital and its staff, sickness is a challenge, a focus of enquiry from which prevention should radiate as well as cure of the individual patient." These words particularly apply to a communicable disease like syphilis in which treatment and prevention are one and indivisible. There are proposals to create a Chair of Preventive and Social Medicine in each medical college. Unless every teacher of clinical medicine in a teaching institution is imbued with the knowledge of the social and environmental impact on disease and integrates his day-to-day clinical teaching with a preventive bias, the mere creation of separate Chair of Social and Preventive Medicine will be one more clog in the wheel of compartmentalism in medical education and will fail in its purpose. Venereal diseases, more than any other group of communicable diseases, offer unique opportunities for the inculcation of the principles and practice of social and preventive medicine.

Venereal diseases are intimately associated with the social condition and economic status of the people. They are not controllable by any means of prophylactic vaccination now known. Immunity is not provided by an attack and efficiency of therapy is, therefore, not a sufficient guarantee against continuation of infection in the population.

Prostitution and Venereal Diseases.

Prostitution and venereal diseases are a sort of siamese twins and no operation has been devised which can separate the two to the destruction of the one and the disappearance of the other. "Prostitution is not a medical problem with a moral aspect, but a moral problem, a socio-economic problem with a medical aspect." The human propensity for sexual promiscuity whether stemming from social, economic or psychological factors, cannot be abolished by an Act of Parliament. In urban areas, prostitution is hydra-headed. We have the commercialized exploitation of many helpless girls and women by a few anti-social parasites. A large number belong to the casual clandestine type. "Wife prostitution" among the lower economic levels with or without the connivance of the husband is another disturbing feature of urban life. Some of the States in the Indian Union have laws on their statute book against commercialized prostitution. But how far they are effectively and honestly applied by the myrmidons of law is anybody's guess. There is no doubt that rigorous law enforcement measures will mitigate and cause reduction in the frequency of sexual exposures per unit of time and result in a corresponding lowering of the venereal disease incidence. Sex is the cheapest commodity among the poorer sections of the urban population and the appalling unhygeinic conditions in which the sex act is performed contribute in a significant measure to the spread of venereal diseases. It is encouraging to note that the Central Government will shortly put before the legislature an all-comprehensive measure for the suppression of immoral traffic in our country. Side by side with law enforcement measures, organized efforts should be made to rouse the moral and sanitary conscience of the community and to inculcate a sense of personal responsibility in the age groups of the population who are most likely to be promiscuous. For the control of venereal diseases, our main reliance should be the public health approach of breaking the chain of infection with the therapeutic, epidemiological and educational hammers.

A national plan for the control of venereal diseases is an urgent desideratum. The Central Government should assume dynamic leadership and call for the co-operation of the constituent States in the fight against these social diseases. In view of the proposed concentration on industrialization in the Second Five-Year Plan, the necessity for control of the spread of venereal diseases assumes a greater urgency and provision should be made for adequate funds in the Second Five-Year Plan.

As syphilis is the most serious of the venereal diseases with respect to its morbidity and mortality, major emphasis should be laid on this disease. In attacking syphilis, the control of all the other venereal diseases will benefit at the same time. In the first instance, one segment of the large syphilis problem, namely, control of infectious syphilis with prevention of pre-natal syphilis should receive the topmost priority.

The control of a communicable disease such as syphilis should vest with the public health authority and this fundamental principle should be impressed upon some of the States, where a dichotomy of health services prevails and communicable diseases like syphilis and tuberculosis are under the administrative control of the head of the curative services. No progress can be made in communicable diseases control as long as this anomaly of criss-cross dualism persists.

Suggested measures for a national plan for the control of syphilis and other venereal diseases.

This is not a blue print for action but tentative suggestions put forward for the consideration of the Government of India and the Planning Commission.

Central Organization.

(1) *A Venereal Diseases Control Division* should be established in the office of the Director-General of Health Services at Delhi. This division should plan, develop and expand a nation-wide venereal diseases control programme during the period of the Second Five-Year Plan. The chief of the division should have a good working knowledge of the clinical and laboratory aspects of venereal diseases on the one hand and of bio-statistics, epidemiology and public health administration as these disciplines relate to venereal diseases.

(2) *The establishment of a Central Advisory Council* under the Chairmanship of the Director-General of Health Services and consisting of Provincial Health Administrators, Clinicians and Laboratory Directors and non-official citizens interested in the social and educational aspects of the venereal diseases control.

(3) *Establishment of Venereal Diseases Control sections in the States* under the administrative authority of the Provincial Directors of Public Health. In the initial stage, a control section may be established in each of the states where high prevalence rates of venereal diseases are reported.

(4) *A Central Reference Laboratory* under the control of the Chief of the Venereal Diseases Division for the central production or purchase of antigen and other reagents and distribution to the other State laboratories, for the setting up of minimum requirements for technical procedures and laboratories, and for fostering uniformity in testing procedures by the publication of manuals on Serology and to initiate inter-laboratory serological evaluation studies.

(5) *Post-graduate Training in Venereal Diseases* for medical officers, laboratory training for serologists and technicians and training of nurses, health visitors, and social workers. Persons with a prior public qualification and experiences should be preferred for post-graduate training both for the administrative and the clinical and laboratory aspects of the venereal diseases control. The medical personnel should be salaried and whole-time and debarred from practice. For the training of medical and para-medical personnel for the control scheme the All-India Institute of Hygiene and Public Health at Calcutta and the Upgraded Venereal Diseases Department of the Government General Hospital, Madras, may be chosen as centres, the former for basic training in public health, public health nursing, laboratory procedures and health education, and the latter for specialized training in venereal diseases control for medical and para-medical personnel.

(6) *Supply of drugs.*—Procaine penicillin in oil with aluminium mono-stearate is the drug of choice for the routine treatment of syphilis and gonorrhœa. The penicillin factory should give a high priority for the large-scale production of procaine penicillin in oil. Pending self-sufficiency of penicillin supplies through manufacture in India, liberalization of import facilities and large-scale purchase from abroad at competitive rates are indicated. Advantage may be taken of the offer of UNICEF to supply free of cost, the requirements of penicillin for the exclusive treatment of women and children suffering from syphilis. Treatment of the infected individual and contacts is the lynch pin of the whole control scheme and is a major item to be budgeted for.

(7) *Preparation of educational propaganda* material in the major languages of the States by a central organization and distribution to the various control units in the States or alternatively the States health administration may assume responsibility for the preparation of educational material to suit the particular social and cultural standards of the State.

(8) Collection, maintenance, publication and distribution of statistical and scientific literatures pertaining to venereal diseases control.

(9) A quarterly bulletin of the progress of the control scheme may be issued from the Venereal Diseases Division of the Central Directorate of Health Services and given widespread publicity. By this procedure, the public will be kept constantly alerted on the importance of the problem besides having an educational value.

At the State level.

(1) Venereal diseases control sections to be established under the Director of Public Health in each of the States. The clinics and laboratories shall be under the overall control of the Venereal Diseases Control Officer of the State.

(2) In consultation with these States, one or more urban centres with a high venereal diseases prevalence may be chosen in each State for establishing control projects. The number of venereal diseases clinics and their locations in each of the chosen urban areas will depend upon the geographical extent, the concentration of the population in particular sections of the area, and on the number of existing facilities in hospitals for the treatment of venereal diseases; the location of clinics in strategic centres is an important consideration in the planning programme. Two types of clinics are visualized : (*a*) The venereal diseases clinics with a certain number of beds for hospitalization, in association with and part of teaching, general and women and children hospitals of the urban area and (*b*) *ad hoc* clinics under the control of and run by the municipal authorities, the latter only providing ambulatory treatment.

(3) Establishment of laboratories for the serological diagnosis of syphilis, bacteriological and cultural examination of other venereal disease specimens in each of the urban areas. A reference laboratory in each state or urban area which will supply antigen, reagents, etc., obtained from the Central Laboratory, would also serve as control to the local laboratories attached to the clinics. The reference laboratory when properly developed would also serve as training centres for doctor serologists, laboratory assistants and technicians. The reference laboratory of each State or urban area may either function as part of a teaching hospital or as a section of a Public Health Laboratory under the Municipal Health Officer. In either case, the reference laboratory should be in a position to perform routinely a battery of two or three serological tests for teaching, training and control purposes, carry out bacteriological and cultural examinations of specimens which may be referred from other clinics.

Every clinic should be organized to carry out dark-field* examinations for T. P. and smear examinations for gonococci and other organisms as part of the daily routine for quick diagnosis and treatment. The *ad hoc* clinics may have their bloods tested for syphilis in the reference laboratory of the area while the clinics with a heavy clinic load attached to teaching hospitals, large maternity hospitals, etc., should be provided with a simple set up for performing as single, quick, easily carried out and economical test like the VDRL slide test.

While blood testing of all patients attending the venereal diseases clinics of the area under control should be routinely carried out, it should be obligatory on the staff of the Maternity and Child Health centres of the urban area to blood test for syphilis every pregnant woman attending the Maternity and Child-Welfare clinics. As these Maternity and Child-Welfare centres are under the administrative control of the Municipal Health Department, the Municipal Public Health Laboratory or the State Reference Laboratory should undertake the testing of bloods of all the pregnant women who will be screened by the Maternity and Child Health clinics. At least two blood tests for syphlis should be the routine procedure in the pre-antal care of every pregnant woman, one early in pregnancy and the other late in the third *trimester* of pregnancy. The male marital partners of the positive reactors among pregnant women should be directed to go to the nearest venereal diseases clinic for examination and treatment. If this epidemiological precaution testing and treating the male marital partner at the same time is not observed a well treated infected wife in early pregnancy may get reinfected during the later months with disastrous consequences to the foetus in utero. This sort of " ping-pong " syphilis in which the infection is batted to and forth between married partners is by no means uncommon in familial syphillis since the advent of penicillin in syphilotherapy. The syphilitic pregnant women should be treated at the ante-natal clinics and not sent to a crowded mixed venereal diseases clinic. With the advent of penicillin, the occurrence of pre-natal syphilis could be virtually eliminated by adequate treatment of every syphilitic pregnant woman; and a great social responsibility rests on all those who look after expectant mothers.

(4) A continuous educational campaign against venereal diseases by all the modern devises to focus public attention and sensitize the public conscience and graded to suit particular educational and cultural levels should be instituted under the supervisions and guidance of the Provincial Control Officer. The responsibility for the preparation of the educational and propaganda material has already been mentioned.

(5) Every venereal diseases clinic and Maternity and Child-Welfare Centre should have on their staff trained Social Workers and Health Visitors for the purpose of interviewing and education of the patients, case-finding and contact investigation. The slogan of these workers should be " Find syphilis and treat faster than it can spread ".

(6) In the control area, the co-operation of the private physicians should be sought for the affording them short training courses, free diagnostic and consultative facilities to enable them to treat their patients effectively. Without doing violence to the patient-doctor relationship, the physicians may be asked to anonymously report the cases under their care to the Public Health authority for statistical purposes. Too much of red-tapism and filling of numerous forms by the private physician should be avoided to obtain the whole-hearted co-operation of the busy practitioner. The physician in his turn should help the health authority or the control officer in case-finding and contact investigation by affording reliable information regarding the identity of the contact obtained confidentially from the patient.

(7) Every venereal diseases clinic should be required to maintain proper records of work performed and send a monthly epidemiological report to the Venereal Diseases Control Officer of his area who in his turn shall be required to send a consolidated report to the Venereal Diseases Control division at the centre.

(8) In addition to the stationary clinics in each of the urban centres, there should be one or more field units attached to one of the clinics or venereal diseases control section for carrying out field surveys and treatment among specific population groups in the rural areas.

Financing of the project will be the joint responsibility of the Central and State Governments. During the first five years of the programme, and for the willing co-operation of the States, the Central Government may have to meet a major share of the cost of the programme.

The cost of penicillin, expensive laboratory equipment, training of personnel and cost of transport are major items to be budgeted for by the Central Government while accommodation for clinic and laboratory and operational costs of the State programmes should be met from State funds. The assistance of UNICEF may be sought for the donation of penicillin and certain specialised laboratory equipment.

Initial phase-planning—First Year.

(1) Establishment of a Venereal Diseases Control Division at the centre.

(2) Obtaining of detailed data from the States through a comprehensive questionnaire.

(3) Preparation of a tentative national programme by the Chief of the Venereal Diseases Division from the data obtained from the States.

(4) Setting up of a Central Advisory Council to discuss, modify and finalise the project and preparation of blue print for action.

(5) Training of medical and para-medical personnel recruited by each State in specified training centres.

(6) Purchase of penicillin, laboratory equipment and transport.

Second phase-project—Two Yea s.

(1) Venereal diseases control section in the States who have opted to come into the National Plan.

(2) Organization of one or more venereal diseases control units in each State.

(3) The establishment of a Reference Laboratory in each State.

(4) Establishment of an adequate number of venereal diseases clinics in each control unit (one clinic for 200,000 of the urban population).

(5) Routine serological screening of pregnant women attending the ante-clinics in the area of the control unit and treatment of the positive reactors to syphilis.

(6) Preparation of educational and propaganda material.

Third phase—Consolidation and expansion of the control scheme in each State—Two Years.

(1) Planned research on the clinical, laboratory, and field aspects of venereal diseases control, by the State control sections in their hospitals, clinics and laboratories.

(2) Field survey and mass treatment of specific population groups.

(3) Assessment of the results of the project at the end of five years in terms of cost analysis, reduction in the quantum of disease in the population at risk who were benefited by the national project.

(4) During the expansion phase of the State programmes at the end of five years, the Central Government may have to render financial assistance but on a more restricted scale which cannot be visualized now.

The details of the staff, equipment, supply of drug, etc., for the project and the financial responsibility of the Centre and the States will have to be worked out by a small committee of experts.

HERE'S TO HEALTH

EDITED BY

Noah D. Fabricant, M.D.

Health is the thing that makes you feel that now is the best time of the year.

—Franklin P. Adams.

It is better to lose health like a spendthrift than to waste it like a miser.

—Robert Louis Stevenson.

A man in good health is always full of advice to the sick.

— Menander.

If you don't get everything you want, think of the things you don't get that you don't want.

— Oscar Wilde.

Health : What people drink to until they collapse.

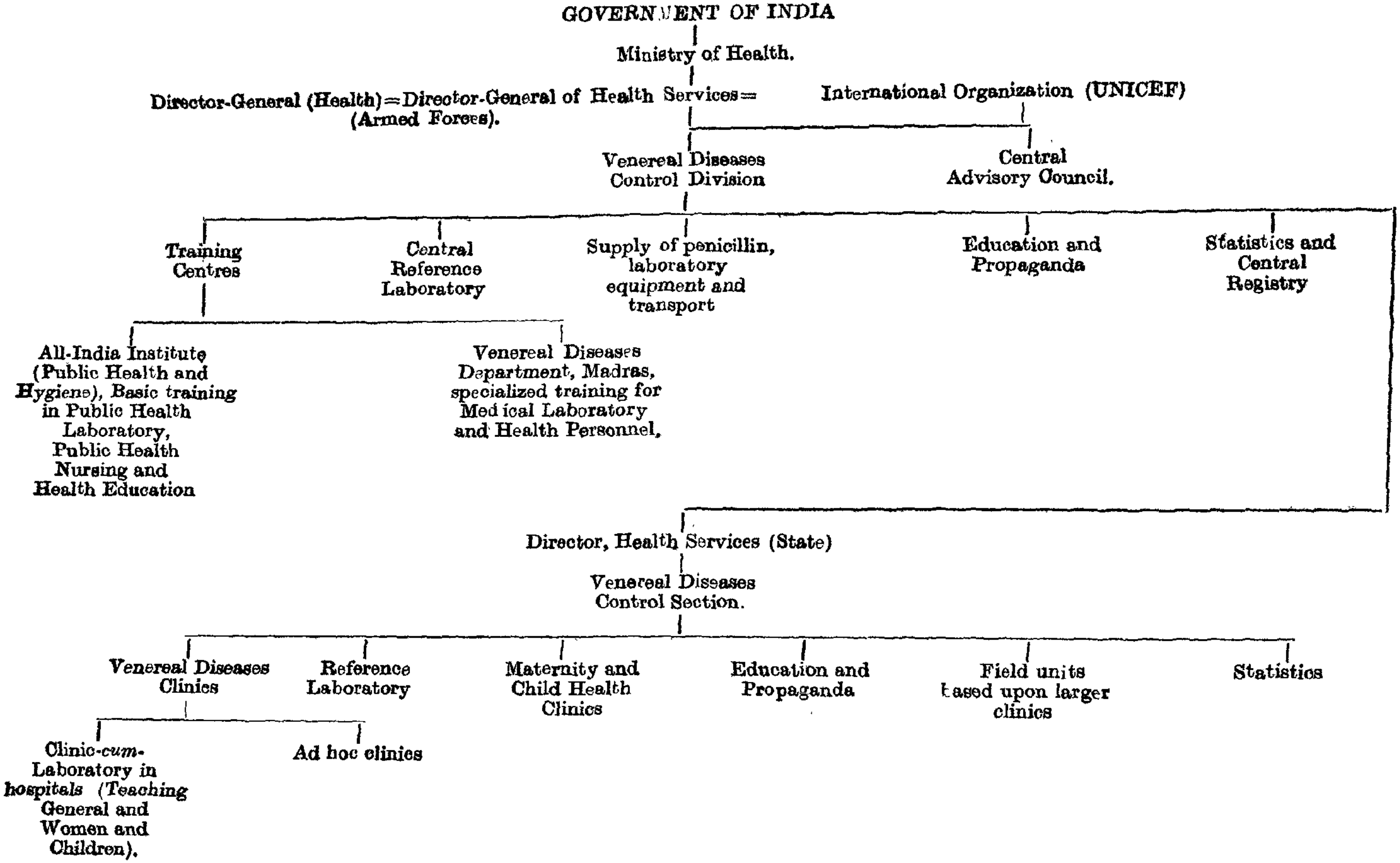
— Author Unidentified.

I've never met a healthy person who worried much about his health, or a good person who worried much about his soul.

— J. B. S. Haldane.

[From " To-day's Health "—July 1955]

Charted Bird's Eye View of the National Programme for Venereal Diseases Control.



ANTENATAL CARE.

BY

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Antenatal care is the health supervision of a pregnant woman and is a combination of the preventive aspect of both obstetrics and pædiatrics services. That a woman who is pregnant needs special attention and consideration was realized long before medical science showed the need and the value of antenatal care. Either in her interest or in the interest of the child in the womb she gets sympathetic understanding and treatment from her family and neighbours. We have only gone a step further by rationalizing this consideration and working out a methodology.

First and Second Trimester.

Antenatal care to be of the maximum value, should be continuous and start early in pregnancy. In this period even the woman who feels well needs a visit from a technically trained person. Instructions on the precautions she has to take for maintaining her health are also required. The value of such visits should be explained to her in the beginning. Every pregnant woman is a potential patient, as she may pass on from the physiological state of pregnancy to a pathological one without much warning. In an antenatal service though there is provision for medical advice in the clinics and follow-up in the homes, these are done only periodically and they last only for a short period each time. For the longest part of the period of pregnancy the woman herself has to be on the look-out for signs and symptoms of disease. Therefore, educating her and her relatives is most important. In the case of medical practitioners who have the full co-operation of their patients this task should be easier. In addition, two types of services, one through the clinics and the other through home visits are to be maintained.

It should be remembered all along that these measures are taken in order to help us in the diagnosis of any slight departure from her normal state of health and arranging for suitable medical aid in time of an emergency. . In some cases where she starts pregnancy in a low state of health, it may be necessary to consider the question of the continuation of pregnancy or its termination. That is why early contact is essential.

A pregnant woman is prone to some diseases peculiar to her condition. Table No. 1 indicates the type of these diseases in a rural centre of West Bengal.

TABLE No. 1—*Showing causes of maternal deaths in a rural centre for the years* **1946** *to* **1952.**

Causes.	*Percentage of total deaths.*
A. Directly due to pregnancy—	
1 Anæmia	39·13
2 Toxæmia of pregnancy	14·13
3 Hæmorrhage	13·04
4 Obstetric shock	5·43
5 Sepsis	4·35
6 Prolonged labour	2·17
7 Embolism	1·08

Causes.	*Percentage of total death.*
B. Associated causes—	
1 Diarrhœa and dysentery ..	**5·43**
2 Malnutrition and general debility.	**3·26**
3 Communicable diseases	**3·26**
4 Cardiovascular diseases	**2·17**
5 Pneumonia and pleurisy ..	**2·17**
6 Malaria	**1·08**
C. Other ill-defined causes—	
1 Heart failure	**2·17**
2 Unknown	**1·08**

In addition to these diseases that theraten her life, some other conditions may make her feel below par. In the earlier months the diseases that are dangerous to her life are not many. One of them, the severe type of vomiting of pregnancy, is not common in our country. The usual complaints are nausea, acidity and frequency of micturition. These are not difficult to handle as in a few days she improves by adopting general hygienic measures. Taking dry sweet food as she wakes up, avoidance of fried things in her meals, keeping the bowels clean and a little rest in the afternoon make her more comfortable.

Third Trimester.

In the later months, specially from the 7th to the 9th month she requires closer and more constant supervision. As shown above the two conditions that cause the greatest concern are anæmia and toxæmia. Unfortunately the accepted aetiological factors for these conditions are not known. So we have to depend on early diagnosis and treatment of these diseases for reducing the number of facilities and knowledge should therefore be utilized to help in the early diagnosis which is made by examination of the urine for the presence of albumin, taking of the weight to indicate sudden abnormal increase, checking the blood pressure, and general medical examination for detection of systematic diseases, and of signs like œdema of the legs which sometimes indicate the presence of impending toxæmia (pre-eclampsia), even when she does not have any complaints. All these examinations may not be possible but a few are always easy to make. In a rural area where a large number of women do not come to the clinic because of the distance to be covered, urine examination, and looking for œdema of the feet should be done even in the homes by midwives and health visitors.

With respect to anæmia also a more concrete and objective method of assessing it is necessary for early diagnosis than the subjective method of looking for paleness and weakness. Complete blood examination is adopted in many clinics to assess the degree of anæmia and its nature. Considerable number of lives can be saved by timely and proper use of such a procedure. Examination of the blood for Hb., R.B.C., W.B.C., and differential count, etc., are included in this. Often it may not be possible to do all these tests. Using the hæmoglobinometer the percentage of Hb. can be checked to indicate the severity of anæmia. In the rural areas even Talquist paper can be a guide to assess the degree of anæmia of the result of treatment.

One more danger in the later months, which might not kill her in the antenatal period but nullify the beneficial effects of antenatal care, is an abnormal presentation or disproportion at the time of delivery. Palpation which does not need any extra equipment other than our hands should never be forgotten or missed for discovering this danger before labour starts. Many abnormal presentations can be corrected in the antenatal period and if they cannot be corrected, proper facilities for a safe delivery can be arranged beforehand by this procedure. Last-minute emergencies can thus be prevented, and the mother, the child and the family saved from anxiety and danger. Therefore, frequent palpations, if possible, weekly or once in two weeks in the last two months of pregnancy are indicated.

Bleeding at any stage of pregnancy and excessive bleeding soon after delivery are a danger to life. Bleeding in early months cannot be prevented very much except by educating the prospective mothers to avoid actions that predispose to bleeding, and also advising them to take rest and get medical aid as soon as bleeding starts. Bleeding of later months and the post-partum bleeding mean a real danger to their lives. Often we lose the women not because of the loss of blood as such, but because they have so little blood to lose due to their poor state of nutrition, and the anæmia. Therefore, to prevent deaths, due to bleeding or shock, improvement of health in the antenatal period and quick efficient assistance at the time of labour are essential.

Other associated diseases need consideration because of their bad effect on the mother's or child's life and health. Syphilis is one of them. Often there are no symptoms or signs to warn of this infection. Therefore a blood test is the only method available to us. In the mother's interest an X-ray of chest is also helpful. Diagnosis of tuberculosis infection and diseases of the heart early in pregnancy might assist in deciding on the continuation of pregnancy. Urine examination for existing diseases of the kidney or diabetic condition should also not be lost sight of. Preventition of communicable diseases also has to be kept in mind, specially because of its possible relationship to the occurrence of congenital defects in the new-born.

These are ideals to aim at but, often we have to be content with only a few of these. Attempts should be made to reach the ideal as we progress and for at least a few cases when possible. The relative value of each of these examinations in different situations will depend on the type of population we deal with, the problem existing in the area we work, along with the facilities available.

Diet.

The part diet plays in pregnancy is of varied importance. The woman in her demand on the different nutrients reverts to her childhood days, by needing them for growth. The growth factor of the foetus, the increased metabolism, the danger of diseases peculiar to her condition, which might have a bearing on diet and nutrition, the storage of some nutrients for the infant to utilize after birth, make her diet a special one. The emphasis should be on the quality of food, and not on the quantity. The foetus also has to store some vitamins and minerals like iron that are deficient in the child's food after birth (breast milk). Even the incidence of congenital malformations are said to have a relationship to the diet the woman gets in early pregnancy. The women who get good food are also able to feed the child at the breast longer after birth. So in order to keep the mother healthy, to get a healthy child, and avoid artificial feeding after birth, a balanced diet will help. Fortunately the average pregnancy lasts only for about 280 days or 9 months and 7 days.

The recommended diet for a pregnant woman, which would meet all her needs and cost about Rs. 1-8-0 a day, is given in Table No. 2.

TABLE NO. 2—*Showing a list of balanced diet for an expectant mother.*

Food articles.	*Amount (per day).*	*Nutritive value (approximate).*
Cereals	6 Chattak.	Calories 2,800.
Pulses	1 "	Protein 90 g. (Animal protein 56 g.)
Roots and tubers (potatoes, carrots, etc.)	3 "	Fat 68 g.
Green leafy vegetables	4 "	Calcium 1·67 g.
Other vegetables	2 "	Iron 46 mg.
Whole or skimmed milk	12 "	Vitamin A 6,700 I.U.
Fats and oils	1 "	Vitamin B-1, 1·48 mg.
Sugar and jaggery	1 "	Vitamin B-2, 2·2 mg.
Fish (small)	4 "	Niacin 26 mg.
Fruit	1½ "	Vitamin C, 76 mg.

Medical Aid.

Another thing to be remembered and planned for in the antenatal period is the place and agent of delivery. Considerable part of an efficient antenatal service can be made fruitless by not having a proper person or place for delivery. This is specially true in the rural part of our country, where medical aid is scarce and transport facilities are very limited. Emergency calls should be reduced to the minimum. For normal delivery cases a trained *dai* may be sufficient. But for those cases where the delivery is expected to be abnormal for any reason, it is essential to get the necessary aid and facilities arranged for long before labour starts. They should not come as emergencies, but as planned action. They should be saved from falling into unqualified and inexperienced hands. This can be done only by proper antenatal care and planning for special help beforehand when needed.

Infant Deaths.

Many children die in early childhood for want of proper care and help during the antenatal period, and at the time of delivery.

Table No. 3 gives the causes of infant deaths in a West Bengal rural centre before 1 month of life and between 1 and 12 months.

TABLE NO. 3.—*Causes of infant deaths in a rural centre for the years* 1946 *to* 1952.

Causes.	*Percentage of total deaths.* 0–1 month.	1–12 months.
1 Prematurity	42·00	5·85
2 Convulsions of all types	13·93	0·70
3 Asphyxia and birth-injury.	9·18	0·80
4 Respiratory diseases	5·05	16·90
5 Sepsis	3·71	6·65
6 Diarrhœa and dysentery.	3·19	24·40
7 Developmental defect	1·96	2·10
8 Malnutrition	1·85	16·09
9 Fever	1·54	10·90
10 Accidents	0·72	2·82
11 Communicable diseases	0·62	7·05
12 Miscellaneous	16·20	5·05

It will be seen that causes that contribute towards nearly 65 per cent of the deaths from birth to one month of life, are prematurity, convulsions and birth-injuries. In order to reduce deaths due to these causes efficient antenatal care, suitable help during delivery and proper service during the lying-in period are necessary. However efficient the infant care may be, deaths due to these causes cannot be lowered markedly. Therefore to decrease the number of infant deaths we have to provide to the community prenatal care. In our country with its scarcity of trained personnel and limited finance, one service like antenatal care, which helps in saving the lives of both mothers and children has a very important place in preventive services.

Proper antenatal care not only reduces the suffering and deaths but also improves the health of the community by providing healthier babies and mothers. The latter's efficiency as mothers is also improved, so that the family as a whole benefits by it. The family has another advantage, i.e., of having fewer occasions for anxiety. By getting the mother to be examined in time in the antenatal period, the family is relieved of the problem of hunting for medical aid if an emergency arises, because it will not come as an emergency, as plans would have been already made. It is not rare to find many families rushing about for getting emergency medical aid and meeting with more than one disappointment, in addition to the anxiety and waste of money.

The society gains by having fewer motherless homes—a distressing social problem. If medical aid is the responsibility of the society or the government there will be reduction in its budget for curative services if good antenatal care is arranged for.

The doctor who serves a community gains considerably by practising antenatal care. Instead of getting a call in an emergency, which often comes too late, he is prepared for it. Therefore he is saved from unnecessary trouble and disappointment that he often meets on these occasions. With proper antenatal care he goes in time with confidence and gets the satisfaction of doing something useful and humanitarian with the least anxiety. He would not keep any case if he cannot handle it himself. Therefore it is a real advantage to the doctor also in the shape of greater leisure, less anxiety, better satisfaction, more gratefulness from the people and better emoluments.

THE BODY BOUNTIFUL

EDITED BY

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He must have had a magnificent build before his stomach went in for a career of its own.

— *Margaret Halsey.*

We are so curiously made that one atom put in the wrong place in our original structure will often make us unhappy for life.

— *J. B. S. Haldane.*

God may forgive you your sins, but your nervous system won't.

— *Alfred Korzybski.*

PLAGUE CONTROL IN MADRAS STATE

BY

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Introduction.

Plague first appeared in Madras State in August 1898 in Guntakkal in Anantapur district. The infection then spread rapidly to all districts surrounding the Mysore State, but the disease took root only in some centres in the districts of Anantapur, Bellary, Kurnool, Salem, North Arcot, Coimbatore and the Nilgiris. From 1900 to 1923 the average plague mortality in the State was about 10,000 per year. Since 1924 there was a decided decrease in plague incidence and the average plague mortality fell to about 2,000 per year up to 1948. The maximum incidence occurs in the cold weather months of November, December and January. During the hot weather months of April, May and June, the incidence is very much less and sporadic in nature with no definite ' off season '.

Methods of Plague Control.

Trapping, poison baiting and the use of kerosene oil emulsion were the chief plague control measures adopted for a very long time. These methods were not very effective in the control of the epidemic.

The introduction of cyanogas A dust is a well-marked stage in plague control. It was first used in India in the Cumbum Valley of Madurai district of Madras State in 1931. After repeated laboratory experiments and field trials, the method was adopted as a plague control measure in the whole of the Madras State and eventually in other States in India.

The advantage of cyanogas fumigation is that it deals with both rats and fleas at the same time unlike the older methods. In skilled hands cyanogas fumigation has given excellent results. The history of complete eradication of plague from Cumbum Valley, Madurai district, which was the hot bed of plague, shows the efficiency of this method. Unfortunately, the same result was not obtained in other areas.

The fact that cyanogas has no residual action and that it cannot be used ordinarily for fumigation of rat harbourages in the roofs of houses where a proportion of rats find shelter and nesting facilities have limited the usefulness of cyanogas fumigation as an anti-plague measure to some extent. Immediately after a round of cyanogas fumigation it was found that both the rat density and flea index were reduced to some extent, but these regained their former level within a period of about three months. It was therefore found necessary to repeat cyanogas fumigation every three months to keep the rat density and flea index within certain limits. Even with this intensive cyanogas fumigation the results were sometimes disappointing as plague broke out shortly afterwards in some of the fumigated villages. The course of the epidemic in infected villages especially the big ones also did not materially change after cyanogas fumigation.

The advent of DDT has revolutionized the control of plague and during the last eight years it has been used on an increasing scale all over the world. The older

methods of plague control like trapping, poison baiting, use of virus and cyanogas fumigation have now been largely replaced, by the use of DDT.

Studies on the Control of Plague with DDT.

From the laboratory experiments and field studies conducted with DDT in the Nilgiri district from 1947 to 1949 by the Special Plague Officer, of the department of Public Health, Madras, it was found that the use of DDT as a plague control measure is far superior to all other previous methods. The following are the important observations noted as a result of the above study :—

(1) It was found that by a single application of DDT treatment in a village (insufflation of rat burrows and dusting of rat runs and other harbourages by 10 per cent DDT powder) the usual flea index of 3 or 4 could be reduced to below 0·5 immediately and that it could be kept below 1 for a continuous period of nearly 16 months after the original treatment, unlike in the case of cyanogas treatment, where the flea index was temporarily reduced slightly immediately after treatment, but regained its normal level within three months (see graphs 1 and 2).

(2) It was observed that during a period of sixteen months in 1948–49 plague occurred in 45 out of the 468 village units regularly fumigated with cyanogas once every 3–4 months; while during the same period all the 90 village units (in the worst plague endemic area of the same district) treated with DDT only once, escaped infection altogether.

(3) It was found that while a single application of DDT treatment was generally sufficient to keep the flea index below 1 for over a period of sixteen months, in the above 90 villages three to four applications of cyanogas fumigations were necessary to achieve the same results in these villages during the same period.

(4) It was further observed that DDT treatment as a plague control measure, besides being more efficient, is much cheaper than cyanogas fumigation. Thus to treat the above 90 village units once during a year, 2,000 pounds of 10 per cent DDT powder were required which cost Rs. 1,750. To fumigate the same 90 village units once, 1,000 pounds of cyanogas A dust were found necessary. Since these villages had to be fumigated once every 3 to 4 months, it required $1,000 \times 3 = 3,000$ pounds of cyanogas A dust during a year, which cost Rs. 4,500. Taking into consideration the cost of the chemicals alone DDT treatment is at least two and a half times less costly than cyanogas fumigation.

Present Plague Control Policy.

Based on the above observations noted in the Nilgiri district, DDT treatment has been adopted for plague control throughout Madras State from 1950 and it has replaced all the other older methods.

Selection of Endemic Villages.

After an epidemiological study of plague incidence in the State during the past fifty years, areas and villages which recorded repeated infection during the ten years from 1940 to 1949 were tentatively selected as endemic areas. To this list was added all villages which had plague outbreaks since 1950 and those villages lying very close to Mysore border. Village in Hosur taluk of Salem district, Kollegal taluk of Coimbatore district, the whole of the Nilgiris district and the municipalities of Coimbatore, Tiruppur, Pollachi, Udamalpet, Ootacamund and Coonoor were considered endemic for plague. All the above villages and towns were taken up for intensive DDT treatment once a year regularly for some years to come.

Method of DDT Treatment.

In villages infected with plague (human or rat plague), all the houses are thoroughly sprayed (floor, walls and roof) immediately with a 2½ per cent suspension of DDT to give a deposit of 50 mgms. of DDT per sq. foot of the surface treated. This is followed by insufflation of all rat burrows and dusting of all rat runs and other rat harbourages with 10 per cent DDT powder. In villages considered endemic for plague and selected for intensive DDT treatment, all the rate burrows are insufflated and rat runs and other rat harbourages are dusted with 10 per cent DDT powder. The cyanogas foot pump is used for insufflation. Usually about 3–4 strokes of the foot pump are required for insufflating a rat burrow. A ring of DDT powder is also put round the mouth of the burrow. This is followed by spraying the roof-wall and floor-wall junctions of houses for a distance of 1½ feet on either side with a 2½ per cent of DDT suspension to give a deposit of 50 mgms. of DDT per square foot. The programme of DDT treatment in the endemic villages is so spread out that all the villages get at least one round of DDT treatment once a year.

Organization.

Based on the above policy, sufficient field staff are appointed for each of the endemic areas. The field staff are divided into units. Each unit consists of a maistry and two mazdoors working a pump and on an average they treat 10–15 houses per day with DDT. The work of 4 to 5 such units is directed and supervised by a qualified Health Inspector trained specially in Plague control work. The District Health Officers and Municipal Health Officers of the respective areas are in overall charge of the control work. Six municipalities and 1,391 village units in three districts with 180,506 houses, having a population of 844,072 form the present endemic areas of Madras State where DDT treatment is being regularly carried out as a Plague control measure by a team of 21 Health Inspectors and 67 field units. The work of all the units are periodically inspected by the Special Plague Officer and flea surveys are carried out in these areas regularly, so that the efficiency of the plague control measures may be thoroughly assessed.

DDT Formulation Used.

Only the following formulations of DDT are used for plague control :—

(1) 10 per cent DDT powder for insufflation of rat burrows and dusting of rat runs and other barbourages.

(2) 2½ per cent DDT suspension spray made from 50 per cent DDT wettable powder to give 50 mgms. of DDT deposit per square foot of sprayed surface. In individual areas the average quantity of DDT products used per house varied from 4·2 oz. to 8·5 oz. in the case of 10 per cent DDT powder and 1·3 oz. to 3·6 oz. in the case of 50 per cent DDT wettable powder, the average for the whole of the endemic areas is being 6 oz. and 2 oz. respectively.

Anti-rodent Measures.

Anti-rodent measures like trapping or use of rodenticides are not being carried out in any of the plague endemic areas as a plague control measure.

Cost.

The total expenditure on Plague control in all the endemic areas including the pay and allowances of Health Inspectors, their peons, the field staff, cost of DDT products, equipment and other miscellaneous contingencies during 1954–55 came to rupees 2,58,387. Taking into consideration the actual population living in the DDT treated villages, the per capita cost works out at annas 4 and pies 10¾ while in individual areas, it varied from annas 2 and pies 5 to annas 7 and pies 8.

Result.

Since the introduction of DDT as a plague control measure, the incidence of plague in the State has decreased considerably and since August 1954, the whole State is free from Plague infection. The districts of Coimbatore and the Nilgiris where plague was occurring regularly for the past several years have been free from Plague continuously since 1952. Fleas Surveys regularly carried out in the endemic areas under DDT control have shown that even after 12 months of DDT treatment the general flea index is less than 1, which is considered too low for any possible outbreak of plague in these areas.

The yearly plague deaths in Madras State before and after the introduction of DDT as a plague control measure is given in the following table (Madras State was partitioned in October 1953) :—

Year.	*Plague incidence.*			
	Composite Madras State.		*Residuary Madras State.*	
	Attacks.	*Deaths.*	*Attacks.*	*Deaths.*
	Before DDT.			
1932	..	1,566	..	..
1933	..	2,591	..	..
1934	..	2,358	..	..
1935	..	645	..	..
1936	..	615	..	..
1937	..	1,127	..	..
1938	..	1,155	..	..
1939	..	324	..	..
1940	..	1,169	..	..
1941	..	1,726	..	..
1942	..	701	..	..
1943	..	4,885	..	..
1944	..	1,738	..	1,494
1945	..	1,644	..	1,426
1946	..	2,254	..	2,021
1947	..	2,718	..	2,275
1948	..	916	..	543
	After DDT.			
1949	453	150	..	74
1950	173	39	..	4
1951	138	62	..	3
1952	23	12	..	12
1953	..	..	9	6
1954	..	..	8	6
1955	..	..	..	..

Summary.

1. Since the introduction of DDT as a plague control measure in Madras State, the Plague incidence has been reduced to a remarkable extent. (See graph III.) In 1953 and 1954, there were only 9 and 8 cases respectively and the whole State is free from Plague since July 1954.

2. Anti-rodent measures are not carried out as a plague control measure.

3. Insufflation of rat burrows and dusting of rat runs and other rat harbourages with 10 per cent DDT powder and spraying of roof-wall and floor-wall angles with 2½ per cent DDT suspension are the methods of application of DDT.

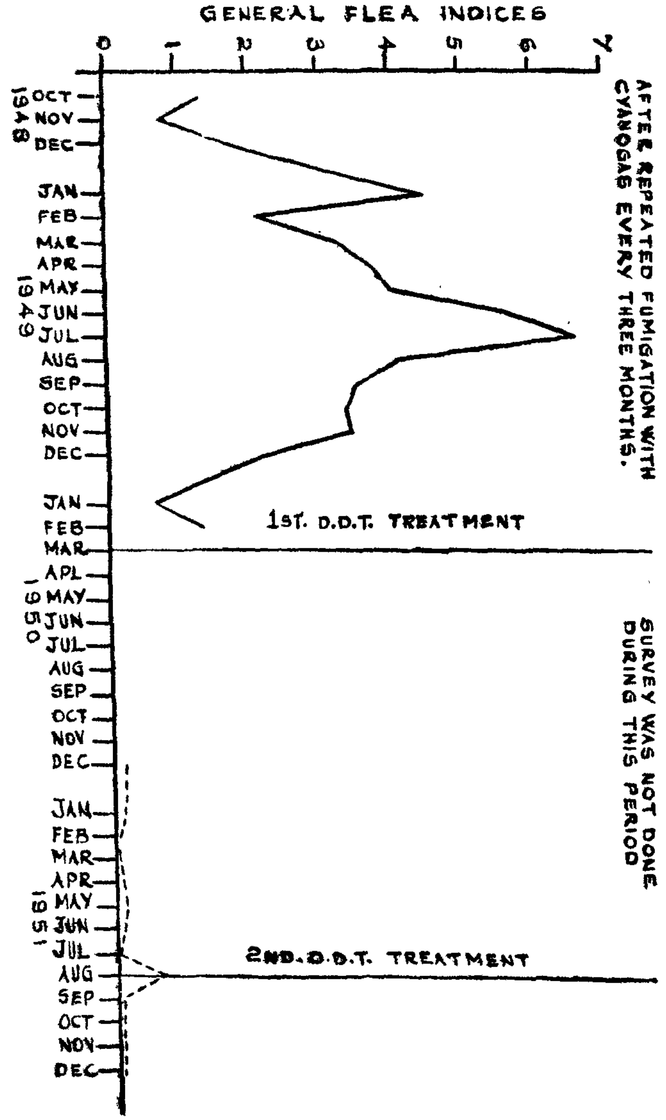
4. Six oz. of 10 per cent DDT powder and 2 oz. of 50 per cent DDT wettable powder are used on an average per house.

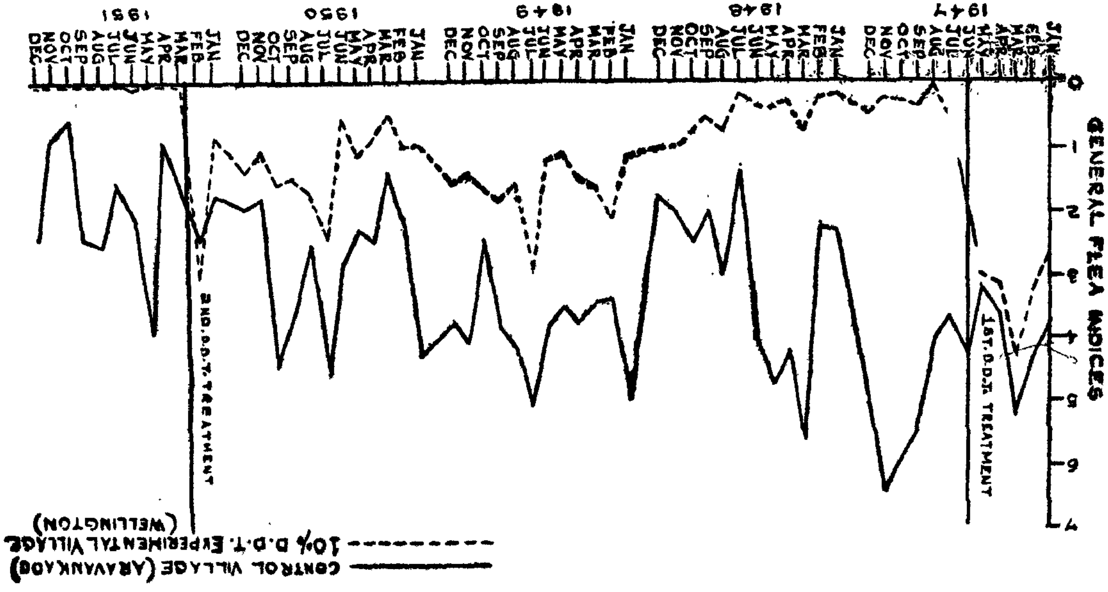
5. The expenditure on plague control inclusive of pay and allowances of supervising and field staff, cost of DDT products, equipments, etc., works out at annas 4 and pies 10¾ per head of the population actually benefited.

GRAPH I.

Coonoor Town.

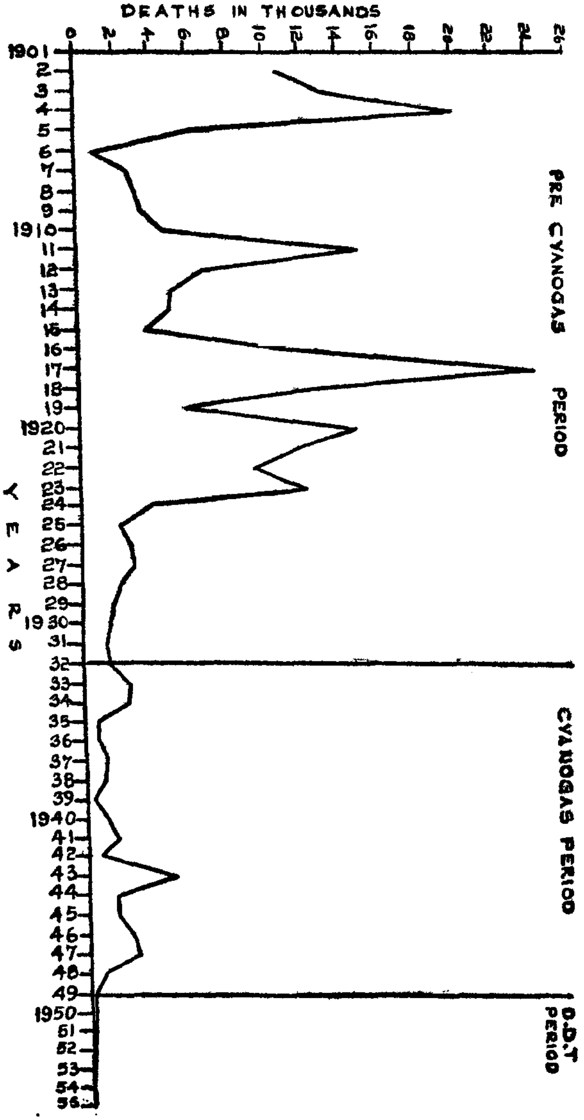
GRAPH SHOWING MONTHLY GENERAL FLEA INDICES AFTER FUMIGATION WITH CYANOGAS ONCE EVERY THREE MONTHS AND AFTER TREATMENT WITH DDT ONCE A YEAR.





GRAPH II.

GENERAL FLEA INDICES OF CONTROL VILLAGE AS COMPARED TO AN EXPERIMENTAL VILLAGE TREATED WITH 10 PER CENT DDT DUST ONCE.



GRAPH III.

DEATHS FROM PLAGUE IN MARAS STATE FROM 1902—1955.

MANAGEMENT OF DIPHTHERIA

BY

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Neutralization of the circulating toxin as quickly as possible remains the main object in the treatment of diphtheria. Early treatment gives the best chance of cure and minimizes complications. Treatment therefore should be started immediately in suspicious cases even on the basis of clinical features alone, bacterial cultures only serving the purpose of confirmation of diagnosis. Diagnosis of the common types of diphtheria is missed not because of the difficulty in diagnosis but because of carelessness. Routine practice of examining the throat of a child for detection of the characteristic diphtheritic membrane, specially when a child is seen for complaints like sorethroat, difficulty in swallowing, salivation, cough with husky voice is obligatory.

Antitoxin.

Antitoxin is the mainstay of treatment. Administration of diphtheria anti-toxin serum early in adequate dose saves nearly every patient and prevents any serious damage to the heart and nervous system. The size of the dose is arbitrary and "*should be too large rather than too small.*" In deciding the dose, severity of the infection, duration of the disease are to be taken into consideration and not the age.

Administration of antitoxin.—The recommended dose should be given as *single intramuscular injection*. Divided dosage given in repeated injections must never be encouraged. The injection is given at the outer aspect of thigh at the junction of upper and middle third. In very severe cases half the amount of recommended dose may be given intravenously. Antitoxin must never be injected subcutaneously. Even at the risk of repetition, it must be impressed that in case of suspicion of diphtheria do not wait until positive culture report is obtained. *It is better to administer antitoxin in error than to wait 24 or 36 hours and lose a life.*

Intravenous antitoxin.—Intravenous antitoxin is used only in very urgent cases as it has its own hazzards. In laryngeal cases it may be necessary to give antitoxin intravenously to hasten the absorption with a view to avert trecheotomy. The injection must be given very slowly diluted with 20 per cent glucose solution. In all cases before giving serum intravenously sensitivity to serum must be tested as a routine. If there be any evidence of sensitivity intravenous serum should not be given even after desensitisation.

TABLE OF DOSAGE OF ANTITOXIN.

Type of disease.	Dose (in units.)	Route of administration.
Nasal	20,000	I.M.
Tonsillar—		
Unilateral	40,000	I.M.
Bilateral	60,000	I.M.
Nasopharyngeal—		
Moderate	60,000	I.M.
Severe	80,000	I.M.
Laryngeal—		
Larynx, tonsils ..	80,000	Half the amount I.V. remaining half I.M.
Larynx, nasopharyngeal.	1,20,000	

1. *Precautions in giving antitoxin.*—Before injecting antitoxin inquire about history of sensitivity to horse serum.

2. Inquire if the patient has received horse serum injection previously.

3. Inquire as to the history of allergic disease particularly asthma, asthmatics are very liable to allergic reaction to serum.

4. Adrenalin hydrochloride solution (1 in 1,000) should be ready in a syringe by the bedside in every case before antitoxin is injected, so that no time is lost in injecting adrenalin when there is allergic reaction to antitoxin injection.

If there be any such history, perform intradermal test for sensitivity. Take 0.1 c.c. of the antitoxin to be injected, diluted 1 in 10 with normal saline, and inject intradermally. Read the result at intervals of 10 and 20 minutes. Sensitivity is shown by local redness, induration and formation of wheal with irregular spreading margins. In case of such reaction the child should be desensitised. Before intravenous injection of antitoxin-sensitivity for serum should be tested as a routine.

Method of desensitisation.—At interval of twenty minutes the antitoxin should be given as stated hereafter. The patient is closely observed for appearance of wheals, asthmatic symptoms, sneezing or shock during the process of desensitization. One of the antihistamine drugs may be given parenterally before the injections are started.

(1) 0·1 c.c. of 1 : 10 dilution *under the skin.*
(2) 0·25 c.c. do. *do.*
(3) 0·5 c.c. do. *do.*
(4) 1·0 c.c. do. *do.*
(5) 0·1 c.c. undiluted serum *do.*
(6) 0·1 c.c. do. *intramuscularly.*
(7) 0·25 c.c. do. *do.*
(8) 0·5 c.c. do. *do.*
(9) 5·1 c.c. do. *do.*
(10) The remaining dose of the antitoxin ntramuscularly.

(As recommended by Margaret H. D. Smith and as modified.)

Serum should never be given intravenously to a serum sensitive patient even after desensitization.

Even when serum is given intramuscularly to a child who is not sensitive to serum, there may be at times a sharp rise of temperature accompanied by chill, but there is no cause for alarm in these cases.

General Care.

Isolation.—Complete isolation is necessary.

Rest.—The child should be kept in bed and all forms of exertion to be avoided for three weeks at the least, even in a mild case. If the case is severe and treatment started late the rest period may have to be extended to six weeks.

Diet.—Stick to a fluid—Diet should consist of milk, fruit juice and thin gruel. Too much fruit juice may be the cause of distension and vomiting. During early convalescence poached or soft boiled egg, mashed potatoes, breadcrumb with milk, can be added. During late convalescence more solid food like fish curry, rice, can be added.

Glucose.—Use of glucose in the treatment of hypoglycæmia often present, possibly due to liver damage, is important. Glucose may be given per rectum when vomiting is present. In severe cases glucose 10-20 per cent solution can be given intravenously in doses of 50–100 c.c.

If the disease occurs in a baby do not allow breast feeding, but milk the mother's breast and feed the baby with a dropper.

Local Treatment.

No form of local treatment is necessary. Irrigation, sprays, gargles are unnecessary, and may actually be harmful because of the danger of otitic complication. For swollen cervical glands hot moist application is comfortable.

Other Drugs and Control of Secondary Infection.

Sulphonamides are of no value.

Diphtheria bacilli are sensitive to penicillin and aureomycin. Moreover both these drugs are of definite value in controlling the secondary infection due to streptococci and staphylococci. Penicillin also appears to reduce incidence of complications and renders carrier stage negative. But penicillin is *antibacterial* and *not antitoxic*. *It does not however in any way replace antitoxin* and should be used only along with the requisite dose of antitoxin. Combined treatment gives considerably better results than treatment with antitoxin only. Penicillin crystalline sodium G can be given in doses of 100,000 units I.M.-8 hourly. Results with aureomycin, as recently observed in our hospital in a large number of cases, compare favourably with penicillin in combination with the antitoxin.

Ascorbic acid—Vitamin C in large doses has been advocated with the idea of a possible mitigating effect on the toxæmia, and because of the associated damage to the suprarenals in diphtheria. The effect of vitamin C therapy in diphtheria is open to doubt.

Special Varieties of Diphtheria.

Nasal diphtheria.—Antitoxin in doses of 10—20,000 units is usually sufficient. Instillation of penicillin 1,000 units per 1 c.c in the nose is helpful. It is worth remembering the possibility of nasal diphtheria in a child coming with nasal discharge or bleeding.

Cutaneous diphtheria.—Besides injection of antitoxin in doses of 30–40,000 units intramuscularly, use local application of compress soaked in penicillin solution (500 units per c.c.).

Laryngeal diphtheria.—In addition to the requisite dose of antitoxin as mentioned above, other measures to afford symptomatic relief to obstruction due to the membrane and swelling and spasm of periglottic structures, the following measures are recommended :—

(1) Atropine—may be given in doses of gr. 1/300 subcutaneously to relieve spasm.

(2) A boiling kettle near the bedside with benzoic or eucalyptus added to the water (one dram to a pint) is helpful, as the patients feel great relief in warm moist atmosphere.

(3) To allay restlessness small doses of bromide and belladonna (pot. bromide gr.vi tr. belladonna ♏ii in ℥ii of water given three doses daily; if necessary tr. camphor co. 5 minims may also be added).

(4) Turpentine stupe on the throat, given frequently gives relief and may help to induce sleep. The neck should be greased and covered with flannel before the stupe is applied.

All arrangements must be kept ready for emergency tracheotomy, Laryngeal diphtheria cases are always to be treated in the hospital. Unusual restlessness with increasing respiratory distress as shown by suction of the suprasternal notch, lower ribs and epigastrium, gradually increasing pulse rate, cyanosis are indications for tracheotomy without undue delay.

Complications.

Circulatory failure is the most serious and dreaded complication. This occurs more often between the fifth and the fourteenth day. The child becomes restless, pulse gets rapid and feeble, may be irregular, cyanosis may appear, and unless rapid attention is given, death frequently occurs. Once well marked signs of circulatory failure set in, little can be done in most of the cases. Prevention therefore remains the best course. Enforcement of rest and early administration of antitoxin go a long way in preventing such complication.

The child with such symptoms should be at once put in horizontal position and if necessary foot end of the bed may be raised. In every severe toxic cases glucose to the amount of 100 c.c. of 20 per cent solution given in slow intravenous drip should be given, and repeated as necessary.

Cortical adrenal extract in dose of 2 mg. given intramuscularly every eight hours is of benefit in view of the fact that in very severe cases ending fatally adrenalin hæmorrhage is not uncommon.

Cardiac stimulants, e.g., adrenalin hydrochloride 1 in 1,000 2 minims every three hours, strychnine gr. 1/120 I.M. caffeine sodii benzoas 2 grains six hourly I.M. are often advised, but their values are doubtful. Oxygen with a view to diminish cyanosis is given, but as the circulatory failure is chiefly a peripheral failure oxygen may not give marked or prompt relief. To allay restlessness bromides or small doses of barbiturates are given. In case of marked restlessness one may have at times to give morphine in doses of gr. 1/16 to gr. 1/32. Diluted whisky sweetened with sugar may be helpful in acting as a diffusible stimulant as well as in inducing sleep (half a drachm is diluted and sweetened and given in sips).

Paralysis.—Paralytic conditions need no special treatment except those on general lines. In cases coming with such paralysis it is known that toxin has already been fixed in the nervous tissue and antitoxin can be of no value. But in those cases where antitoxin has not been given previously and the child has been brought within ten to fourteen days of an antecedent history of sore throat one may administer antitoxin. Vitamin B, quite often advised is also of doubtful value.

A child with soft palatal palsy may require nasal feeding with milk, malted food, fruit juice, etc. In cases of intercoastal paralysis the child should be put in a respirator. In paralysis of the limbs recovery can be hastened by gentle massage of the limbs.

Respiratory complications.—With routine use of antibiotics, respiratory complications are expected to be few. In laryngeal diphtheria the disturbing cough and restlessness can be relieved by steam inhalation, small doses of atropine sulphate injection gr. 1/300 and sedatives as mentioned above.

For secondary respiratory complication sulphonamides may be used besides penicillin. Oxygen should be given freely. It is well known that tracheotomy favours such respiratory complications.

Convalescence.

The requisite period of rest should be enforced. Undue hurrying over convalescence must never be encouraged. Gradual feeding on more liberal lines and tonics containing iron to combat with associated hypochormic anæmia are the usual measures to be taken. A plain ferri et ammon citras mixture containing 5 grains per dose given three times daily for a child three years of age is considered quite sufficient.

Carriers.

Only about 10 per cent carriers carry virulent organisms, non-virulent carriers need no treatment. Penicillin in a total dose of 6,000,000 units spread over a period of six days usually eliminates all positive nose and throat carriers. Aureomycin also is quite good. For those who remain positive, after two weeks another course of penicillin should be given. Local drops of penicillin 1,000 units per c.c. every two hours should be advised in nasal carriers. Persistence of carrier stage even after such intensive penicillin therapy should be considered for tonsillectomy and adenoidectomy. But no operation should be advised earlier than two or three months after intitial attack of diseases or until careful examination including electro-cardiagraphic examination shows no evidence of mycardial damage.

CHANGING STRATEGY IN MALARIA CONTROL.

BY

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The impetus that malaria-control programmes have acquired throughout the world would have seemed incredible before the discovery of residual insecticides. F.J. Dy (1954) has summarized the documentation presented by most of the governments which sent delegates to the First Asian Malaria Conference in 1953, and it is impossible not to be struck by the size of the national programmes in the South-East Asia and Western Pacific Regions. A similar observation may be made as regards other parts of the world.

If, as was generally believed ten years ago when DDT was first applied in malaria control, the insecticide campaigns did have to be repeated year after year, and if—as was thought until two or three years ago—there was no evidence of anophelines developing resistance to chlorinated-hydrocarbon insecticides, the present scope of national programmes could only be a source of deep satisfaction to malariologists and public health administrators.

Recent knowledge, however, makes one wonder whether the present strategy should not be revised.

Let it be emphasized that by house-spraying with insecticides we can well aim not merely at controlling malaria but even at eradicating it. Malaria eradication does not mean or require eradication of the anopheline species that carry the disease in a given area. It only means eradication of the malaria parasites. If transmission does not take place, the infections of the malarious patients, with or without treatment, would be cured. It is well known that malaria, when it does not kill, is spontaneously self-curing. Infection with *Plasmodium falciparum* generally lasts no longer than one year; with *P. vivax* generally no longer than two, or, exceptionally, three or four. The same is not true of infection with *P. malariae*, for we have learnt from experience with blood transfusions that this may indeed last throughout life. But we do not exactly know for how many years it remains infective for the mosquitoes, whereas we know that it always infects them with more difficulty than is the case for *P. vivax* or *P. falciparum*, and that *P. malariae* is by far the rarest of malaria infections and in many places is not present at all. If infection with *P. malariae* is disregarded, it must then be admitted that, once the transmission of malaria in a country has been completely stopped for three or four years, there will be no more malaria parasites in the human or the mosquito host. If we then withhold malaria control, provided we effectively protect the country from reimportation of parasites, malaria will not return.

It seems that this has become to-day one of the objectives in planning malaria-control programmes. We know, of course, that in some countries, this objective has already been attained.

When the first Expert Committee on Malaria of the Interim Commission of World Health Organization considered, in 1947, the modern methods of malaria control, it

said in its report that " DDT probably will have to be used as a recurring measure—as chlorine is used in water-supplies—and therefore expenditures may be expected to be maintained " (1948). In the third report of the World Health Organization Expert Committee on Malaria (August 1949) the committee still recognized that: " An apparent drawback of the house-spraying programme is that once used it has to be continued. Nevertheless, the permanent use of domestic residual insecticides will not necessarily be confined to the prevention of malaria but may be directed also to the control of other noxious house-haunting arthropods, some of them vectors of disease " (1950).

In its fourth report (December 1950), however, the possibility that residual spraying might eventually be discontinued seemed to be implicit when the committee pointed out that, " so long as there is any focus of malaria in the area, or endemic malaria existing on its borders, it is not wise to terminate a residual-spraying project even though clinical malaria appears to have become rare " (1951).

It was only in the fifth report (September 1953) that the committee had on its agenda the question of the interruption of residual-insecticide spraying and, impressed by the plan of interruption in Greece, concluded that " the practice of discontinuing residual spraying, under proper safeguards, after several years of achieved malaria control, is both logical and feasible, and should be given careful consideration by administrations that have carried out malaria control to a satisfactory end-point in all or the major parts of their territory " (World Health Organization, 1954).

The implications of this statement are of great importance for malarious countries. It recognizes that, under appropriate circumstances, residual-spraying schemes may eventually lead to the elimination of the recurring expenses of malaria control. It is true that malaria control by residual insecticides is economically feasible and therefore much cheaper than the methods one had to employ before the second World War, but national malaria-control programmes, protecting millions of people, do represent a heavy expense. It therefore seems obvious that, on the basis of such an authoritative statement as that issued by the World Health Organization Expert Committee on Malaria, many health administrations of maria-ridden countries would hope to discontinue malaria control in the near future or would be encouraged to adopt nationwide malaria-contro plans, believing lthat these plans would entail expenses limited to a small number of years.

However, it appears that there are not many countries to-day in which it would be advisable to discontinue residual-insecticide spraying, because the requisites indicated by the expert committee in its fourth and fifth reports are not met. First of all the discontinuation requires " several years of achieved malaria-control ", in other words, the certainty that transmission has not occurred for several years and therefore that malaria parasites in man or mosquito no longer exist in the given area. Further, the area where this end-point of transmission has been reached and maintained must be a major part of the territory, possibly so outlined as to have no endemic malaria on its borders or within them. Planning towards the objective of eradicating malaria and therefore of ending active malaria-control will then have to take account of four desiderata :—

First, within the area to be controlled, every locality where transmission is possible should be under control. It has been customary in many countries not to spray villages with very low spleen-rates or those that were too remote from the highways. This procedure would jeopardize the possibility of discontinuing the campaign, because it would leave sources of infection within the controlled area.

Secondly, the assessment of results should be so organized as to make it possible to ascertain if and where a total interruption of malaria transmission has been

achieved. It is felt that the usual malariometric survey methods are not sufficiently sensitive for this purpose. As a matter of fact, it might be said that such methods lose much of their utility both where transmission is extremely intense and where it is at vanishing point. In the latter case, infant parasite-rates may have reached zero, though some transmission is still occurring. Therefore it seems necessary that the localities should be visited regularly and that all the subjects having fever or having had fever during the intervals between visits should have their blood examined. This active search for cases, such as is being carried out in Greece, seems necessary; but it should be started at least one year before interruption of the spraying campaign is envisaged, in order to be as sure as possible that such interruption will be applied only where appropriate.

Thirdly, malaria control should be implemented with the greatest technical thoroughness, all at one time and in as large an area as possible, preferably bordered by areas where, naturally or as a result of control, there is also no transmission.

If malaria has been eradicated from country A but is still prevalent in countries B and C, and if the inhabitants of each country have free access into and out of the others, the possibility of reintroducing malaria parasites into the area from which they have been eradicated is evident, and such a reintroduction will be proportionate in importance to the movements of the parasite carriers. However, if the adjacent countries of a continent have done so, it will then only be possible for parasite carriers to be introduced from another continent.

Fourthly, appropriate safeguards such as those indicated in the fifth report of the Expert Committee on Malaria, should be introduced to ensure rapid detection of any case of malaria and prompt elimination of possible transmission.

Development of resistance.

This is the second point that one must keep in mind in planning malaria-control programmes to-day.

Resistance to an insecticide, as defined by the Symposium on the Control of Insects, Vectors of Disease held in Rome in 1953, "is the development of an ability in a strain of an insect to tolerate doses of toxicants which would prove harmful to the majority of individuals of a normal population of the same species. The term 'behaviouristic resistance' describes the ability to avoid a dose which would prove harmful" (1954).

Behaviouristic resistance may not interfere with malaria-control. It did not in the case of *A. albimanus*, described by H. Trapido, but physiological resistance, when high, is bound to interfere. Physiological resistance has probably not yet occurred in many species of anophelines, but we know that it has been proved in the case of *A. quadrimaculatus* in the United States of America and of *A. sacharovi* in Greece and, very likely, in Lebanon. Recent information from Greece indicates that the other two vector species, *A. maculipennis* and *A. superpictus*, have also developed some degree of DDT resistance. One may argue that DDT resistance developed in Greece because DDT was also used against the aquatic stages of the mosquito; but in the two Lebanese villages where *A. sacharovi* was found to have become resistant this was not the case. These facts are a warning that the development of insecticide resistance may eventually occur with other anopheline vectors, and that therefore the continuation, year after year, of house-spraying may lead to a failure of the insecticide to control malaria. At this time, the degree of resistance of *A. sacharovi* in Greece to chlorinated-hydrocarbon insecticides is not such as to suggest that adequate dosage or appropriate repetition of spraying operations should not control transmission and in September 1953

the Expert Committee on Malaria could state that " in no case has such resistance so far constituted an important barrier to malaria control " (World Health Organization, 1954). Still, we have been informed that in 144 villages in Greece cases of malaria occurred in 1953 in spite of the fact that the villages had been " preventively " sprayed. This seems to indicate that, in these particular cases, recent DDT deposits had failed to prevent transmission.

Conclusions.

We have already said that instances of DDT resistance in anophelines are rare in spite of the fact that in many countries this insecticide has been sprayed for at least nine or ten years. But can we disregard the warning of Greece? If we do, we may be faced with the fact that after some years of a large-scale programme resistance will develop. If by that time malaria has not been fully controlled, we may replace the insecticide by another; but there is reason to believe that once resistance has developed to one of the chlorinated-hydrocarbon insecticides, such as DDT, it very soon extends to the other members of the same chemical group as well. If this occurs, one can foresee that transmission may mutiply unchecked among a population who would have lost most of the immunity they had acquired before the campaign started; and the health services would have either to use organic-phosphorous insecticides—at best, more dangerous and more expensive—or to avail themselves of the techniques of malaria control that prevailed before the second World War, though these would surely be more efficient to-day if they were based on the use of modern antimalarials. If resistance develops when malaria has been eradicated, it would appear that no dire consequence would follow, because the insecticide campaign could perhaps be withheld. But one of the safeguards that must be available when discontinuing a malaria-control campaign, and precisely the most effective and economical one—immediate house-spraying—would have become inoperative.

To heed the warning from Greece means to plan the programme in such a way that house-spraying could be safely discontinued before insecticide resistance develops. Obviously the larger the area throughout which the end-point of transmission is attained all at the same time, the earlier and the more safely can the spraying be discontinued. No less important than the size of the area and its configuration will be the methods adopted for control; they should prevent (so far as present knowledge allows) the development of resistance; that is, indiscriminate spraying and the use of the insecticide for larval control should be avoided.

It is realized that this new pattern of planning, which must be conceived of in terms of huge areas, of total coverage, of great thoroughness of control, and of a minimum of years, will be difficult and that its implementation will require more funds, more trained personnel, greater efficiency of operations, and better systems of epidemiological surveillance than are necessary now. Further, it may require inter-country co-ordination of programmes. These difficulties would be compensated for, however, not only by better and quicker results, but also by the hope that after a few years of intense efforts, malaria control would no longer represent an important item in the year budget of the health administration. Should this new and bold planning not be adopted, the penalty might vary. In the more favourable cases, house-spraying would remain effective, but would have to be continued year after year; in the unfortunate cases, insecticide resistance would develop, increase, become polyvalent, and the whole programme might ultimately end in failure.

VACCINES AND SERA

BY

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There is lot of ignorance regarding vaccine and sera not only amongst the lay public and the general practitioner, but also amongst health and medical officers in Government service. Many of the medical officers are not even aware of the several protective vaccines, etc., that are available at the King Institute or in the open market.

Vaccines.—A vaccine is an emulsion of organisms which are killed, attenuated or modified, or living. Most of the vaccines that are commonly used to protect people against cholera, typhoid, etc., are emulsions of killed organisms. The cholera or typhoid organisms are first selected and grown in suitable media and then killed by heat or by the addition of an antiseptic such as carbolic acid or other antiseptics. Then the emulsion is diluted to contain a particular number of organisms per cubic centimetre and this is known as standardization. All vaccines are not necessarily standardized in the same way; in some cases, as for instance the plague vaccine, the standardization is done by the mouse protection test.

This standardized vaccine is put up in sterile ampoules or rubbercapped vials or bottles and is ready for use. Before the vaccine is actually distributed or sold, it is incumbent according to international regulations, that each batch is tested to be safe for use on human beings, and even to animals. Each batch is tested chiefly for the following :—

1. *Purity.*—This is to show that cholera vaccine contains only V. cholera, typhoid vaccine contains only B. Typhosus Para A and B and so on.

2. *Toxicity.*—This is to show that the prescribed dose of the vaccine does not produce a severe reaction in a normal individual.

3. *Sterility.*—This is to show that no living organism is present in the vaccine. This test is of course not necessary in other types of vaccines (which are briefly described below) where living or attenuated organisms are used.

The attenuated vaccine is obtained by growing a particular organisms for several generations under conditions that are not quite optimal for the growth of that organism. The B.C.G. vaccine about which our State and the Central Governments have taken a lot of interest as a result of which mass vaccination is now being carried on in several places in India is a typical example of an attenuated vaccine. The original sample or the bovine strain of the Tubercle bacillus was grown for several generations by Calmette and Guerrine in a particular medium till it has lost its power to produce disease in man. This particular strain is now being maintained very carefully in the different laboratories where B.C.G. vaccine is being prepared. In this case an additional test is done on each batch of vaccine to confirm that the organism is still virulent. This test is done by injecting a guinea pig and watching the animals for three to six months. In the case of the B.C.G. vaccine no progressive lesion is produced in the animal, whereas the guinea pig dies when injected with the pathogenic strains of M. Tubercle.

An example of the third type of vaccine where live organisms are used is the vaccine lymph. It is the vaccine that protects you

from smallpox. This vaccine is an emulsion of cow-pox virus to which human beings are much less susceptible. Cow-pox or vaccinia is closely related to smallpox or variola. If variola material is used for protecting us, there is every chance that several of those who are variolated may suffer from an attack of smallpox. But every one is aware, we do not suffer from a general attack of smallpox after being vaccinated with vaccine lymph. This discovery was made by Jenner who noticed that milk maids and others who are in close contact with cattle rarely suffered from smallpox.

There are several other modified vaccines such as Toxoids, Alum precipitated, Toxoid-antitoxin fluccules and so on. These are chiefly used in protecting human beings against such dangerous diseases as Diphtheria, Tetanus, etc. The organisms that produce these diseases are so dangerous that even the injection of small quantities of killed organisms or their products may prove fatal to human beings on account of their very potent toxins. Therefore these organisms are treated by heat, formalin and other reagents until the toxic property of these organisms is destroyed, though the antigenic or protective power is preserved.

Anti-sera.—Anti-sera do not contain any bacteria or their products. Anti-sera are chiefly used to treat such fatal diseases as Diphtheria, Tetanus and Gas gangrene. These are prepared by injecting increasing doses of bacteria or their products into animals, chiefly horses. This process is known as "immunisation". Then the blood of these immunised animals is collected after a lapse of six months or more; the serum or the liquid part of the blood is separated from the red blood cells, purified, concentrated and standardized. This whole process takes about six months.

These anti-sera contain ready-made antibodies which are capable of neutralizing the toxins or the poisonous products of the particular bacterium with which the anti-serum is prepared. Thus, these anti-sera are capable of acting immediately after injection into the patient and this is known as passive immunisation. Vaccines on the other hand produce active immunisation; it takes about five to fifteen days to acquire the necessary protection, after the injection of a vaccine, as the injected individual himself has to produce the anti-bodies. It is therefore necessary to give an interval of at least seven days, between two injections of the same vaccine. Several doctors are anxious to give vaccines at shorter intervals. They should remember that to obtain the best results and also to lessen the reaction, it is best to give an interval of seven to ten days, between consecutive injections of a vaccine.

Anti-sera are also sometime used to protect people that are in immediate contact with patients suffering with any one of the above disease. One should remember that this protection is very short-lived and lasts only for about ten or fifteen days. Therefore, sera should be used as protective agents only very rarely, and never as a routine. It is always best to use a vaccine for protective purposes and sera for curative purposes.

It is good to know something about the reactions that are incidental to the use of vaccines and sera. Our body is always sensitive to any aggressor. This is one of the protective mechanisms provided by nature. The body feels and always reacts by mobilising all its defence mechanisms to isolate and throw out any foreign body (a vaccine, sera, etc.), that is introduced into the system. So please do not go away with the idea that there is no reaction at all after these injections. But please realize that these reactions are negligible and are worth the trouble when you consider the protection they offer against such fatal diseases as smallpox, cholera, tetanus, diphtheria, etc. It is also important to remember that one protective inoculation does not usually protect you for life. Therefore it is imperative that these protective inoculations should be

repeated whenever necessary and especially in the presence of an epidemic in your neighbourhood.

Most people are aware that an individual acquires protection against a certain disease only about five to fifteen days after the injection of the particular vaccine. It is during this period that the defence mechanism of the body gets the training in fighting against the aggressor and gains the experience by which the body mechanisms have learned to outmanoeur and defeat a second attack by the same aggressor. For example, when a foreign body such as typhoid vaccine is injected into the body, the body mechanisms fight against the typhoid bacilli and their toxins and ultimately throw out these foreign bodies and thus gain the experience of defeating this particular organism. So, if some more typhoid organisms are introduced into the body after sometime the body mechanism as a result of its previous experience, mobilises its defence mechanism much more readily and saves the body from the effects of the aggressor, the typhoid baccili. The different cells of the body which take part in this fight react differently to different organisms and therefore the period of protection varies with the particular vaccine. For example, the protection obtained by the injection of cholera vaccine lasts only for about six months, whereas it lasts for about two to four years, if not more, in the case of small-pox and yellow fever vaccines.

Lastly a few words about certificates in connexion with International travel. Please note that vaccines and sera are available for sale to the public at the King Institute, Guindy, Madras, on the production of a prescription from a medical practitioner. The only exception to this rule is the yellow fever vaccine. This vaccine is stocked at the King Institute, Guindy, and the injections are given only by an officer of the King Institute. These injections are given at the Institute only on Fridays between 11 a.m. and 12 noon. If Friday happens to be a holiday, the injections are given on the previous working day. No fee is charged at the King Institute for inoculating any individual who requires a certificate in connexion with his International travel. Please note again that inoculations against yellow fever are given at the King Institute only on Fridays and International regulations do not permit any relaxation of this rule. All other vaccines could be given on any working day.

A PLATFORM FOR TO-DAY'S HEALTH.

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7. Sickness insurance for all.
8. A fight against fraud and quackery.

[From "To-day's Health"—April 1955.]

When the Desire for Good
Health and a Long Life Exceeds
The Constant Craving for too Much
Food; Obesity is no Longer a Problem.

FILARIASIS IN MANGALORE (SOUTH INDIA)

BY

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(July 2, 1954).

[From the "Indian Journal of Malariology," 9, 1, March 1955, pages 1 to 16.]

An investigation into the incidence of filariasis in the municipality of Mangalore was carried out during the period March-April 1954. The findings are recorded in this paper.

Mangalore is the headquarters of the South Kanara district of Madras State. The town, a terminus of the Southern Railways, is situated on the West Coast of India and covers an area of about 18 square miles. The range of the western ghats bounds the town on its northern and eastern sides, while the Ullal river forms the southern limit. The Gurpur river runs parallel to the sea-coast on the western side of the town before joining the Arabian sea.

For administrative purposes, Mangalore has been divided into 25 wards. Extensive groves of coconuts and arecanuts abound in the town. In some places, fields with wet cultivation are also present. The total population of the municipality according to last census (1951) is 117,095 and consists of Hindus, Christians and Mohammedans. The population of the different wards varies from 2,319 in Ward No. 10 to 9,994 in Ward No. 3.

The regional languages are Kanarese, Konkani and Tulu. A small proportion, mainly immigrants, speak Malayalam, Tamil and other South Indian languages. The literacy rate among the population is high.

Meteorological Conditions.

Temperature remains warm and the humidity high throughout the year. Rainfall is heavy (about 120-150 inches annually) and precipitation occurs mainly from June to September. Except during the height of the monsoon (July-August) favourable conditions appear to exist almost throughout the year both for the breeding and longevity of the local mosquitoes.

Water-supply.

There is no protected water-supply for the town, and wells are the main source of domestic water-supply. There are a number of tanks, some of which form an additional source, especially after the monsoon. During summer, most of the tanks go dry and water-supply from the wells becomes poor. A scheme for protected water-supply for the town has been sanctioned and is expected to be implemented in the near future.

History of Filariasis and Previous Surveys.

There is an impression among the old residents of the town that cases of filariasis have been increasing alarmingly during recent years. It would appear that the number of cases were comparatively few about a couple of decades ago. Such cases appear to have been limited to the coastal areas. The cases at present are not only increased in numbers but have spread in the

entire town. There is not a single ward free from it. A cause for worry to the citizens and to the city fathers is the occurrence of elephantiasis, particularly in girls of the younger age groups.

Filariasis surveys of the town have been carried out during the past four years by the staff of the Madras Public Health Organization. The available data are presented in Table I. The disease rate among the community during these years has ranged from 2·2 to 4·7 per cent, while the microfilaria rate varied from 3·9 to 9·9 per cent.

TABLE I.—*Previous Filaria Surveys of Mangalore Municipality*, 1950–53.*

Year.	Number of persons examined. For disease.	Number of persons examined. For Mf.	Average per ward. Disease rate.	Average per ward. Mf. rate.
1950	2,501	1,012	3·6	9·9
1951	2,503	1,179	2·2	7·4
1952	1,489	1,489	4·4	3·8
1953	1,297	1,297	4·7	4·6

* Data obtained from the unpublished records of the Regional Malariologist available from the Municipal Health Office, Mangalore.

Present Work.

1. Investigations on the following lines were carried out to elucidate details regarding the epidemiology of filariasis in Mangalore :—

(*a*) *Blood survey.*—Random representative samples of population from all the 25 wards, covering all age groups and both sexes among the different social strata, were examined in order to determine the incidence of filarial infection and filarial disease in the community. Blood smears were collected during nights between 9-30 p.m. and 1 a.m. by house-to-house visits. Approximately 20 c.mm. of blood from a pricked finger of each person, was obtained on a clean glass slide and the blood spread into a thick oval smear, about one inch long and 0·5 inch broad. The slide was marked with the same number as appearing in the register in which other details, viz., name, parents' name, age, sex and external signs or symptoms of filarial disease, if any, were recorded. The slides were stained and examined on the following day, for microfilariæ. The entire smear was examined before declaring a slide negative. When a smear was positive, the species and the total number of microfilariæ in the smear were recorded. The results have been analysed and presented in Tables II, III and IV.

TABLE II.—*Filaria Survey—Mangalore Municipality (March–April* 1954).

Ward number.	Population.	Number of persons examined.	Percentage of population examined.	With disease. Number.	With disease. Percentage.	With microfilaria. Number.	With microfilaria. Percentage.	Endemicity rate per cent.	Average infestation or microfilariae per 20 c.mm.
1	7,285	370	5·1	25	6·8	61	16·5	23·0	34·0
2	4,962	323	6·5	22	6·8	55	17·0	23·8	36·3
3	9,094	603	6·7	32	5·3	67	11·1	16·2	51·1
4	3,284	253	7·7	12	4·7	32	12·7	17·4	26·0
5	5,748	237	4·1	40	17·0	25	10·6	27·0	25·1
6	3,846	287	6·9	23	8·6	36	13·4	22·0	49·5
7	4,542	296	6·5	25	8·4	53	17·9	26·0	34·0
8	7,103	441	6·2	32	7·3	85	19·3	23·4	37·6
9	2,976	366	10·9	53	16·2	64	19·6	35·6	42·4

Table II.—*Filaria Survey—Mangalore Municipality (March-April 1954)*—cont.

Ward number.	Population.	Number of persons examined.	Percentage of Population examined.	With disease. Number.	With disease. Percentage.	With microfilaria. Number.	With microfilaria. Percentage.	Endemicity rate per cent.	Average infestation of microfilariae per 20 c.mm.
10	2,319	267	11·4	31	11·6	35	16·9	27·7	25·6
11	4,445	300	6·7	39	13·0	62	20·7	32·7	60 5
12	2,404	134	5·6	21	15·7	22	16·4	31·3	26·0
13	4,908	314	7·7	34	10·8	52	16·5	26·7	52·1
14	2,688	216	9·7	23	7·7	24	9·2	16·5	57·1
15	5,441	273	5·1	15	5·5	29	10·5	16 0	38·8
16	2,344	207	8·8	50	7·2	14	6·7	13·4	53·1
17	6,617	428	6·4	55	16·8	69	21·0	37·5	45·6
18	2,887	278	9·6	19	6·9	36	12·9	19·8	30·6
19	3,356	232	6·9	21	9·0	30	12·9	21·9	39·1
20	3,845	270	7·0	30	11·1	44	16·3	26·3	28·1
21	3,907	288	7·3	41	14·2	47	16·3	27·8	43·8
22	6,567	225	3·4	27	12·0	39	17·3	29·3	49·1
23	4,607	269	5·8	28	10·4	40	15·0	24·9	34·0
24	5,124	219	4·3	20	9·1	39	17·8	26·9	66·0
25	7,610	322	4·2	24	7·4	42	12·0	19·4	61·5
Total ..	1,17,095	7,402	6·3	704	9·5	1,112	15·0	24·2	40·43

Table III.—*Incidence of Filariasis in different age groups and the two sexes.*

Age group (years).	Males. Number examined.	Males. With disease. Number.	Males. With disease. Per cent.	Males. With microfilariae. Number.	Males. With microfilariae. Per cent.	Females. Number examined.	Females. With disease. Number.	Females. With disease. Per cent.	Females. With microfilariae. Number.	Females. With microfilariae. Per cent.	Both sexes. Number examined.	Both sexes. With disease. Number.	Both sexes. With disease. Per cent.	Both sexes. With microfilariae. Number.	Both sexes. With microfilariae. Per cent.
2—5 ..	177	0	..	10	5·5	169	1	0·6	9	5·3	346	1	0·3	19	5.5
6—10 ..	432	10	2·3	57	13·2	387	2	0·5	54	14·0	819	12	1·5	111	13·1
11—20 ..	1,310	108	8·2	204	15·6	992	81	8·2	166	16·7	2,302	189	8·3	370	16·1
21—30 ..	933	73	7·8	146	17·6	733	107	14·6	109	14·9	1,666	180	10·8	255	15·0
31—40 ..	528	48	9·1	90	17·3	492	81	16·4	61	12·4	1,020	129	12·7	151	14·8
41—50 ..	389	42	10·1	71	18·2	334	64	19·2	45	13·5	723	106	14·7	116	16·0
Above 50 ..	300	37	12·3	54	18·0	226	50	22·1	36	15·9	526	87	16·5	90	17·0
All ages ..	4,069	318	7·8	632	15·6	3,333	386	11·6	480	14·4	7,402	704	9·5	1,112	15·0

Table IV.—*Incidence of Filarial disease manifestations.*

Disease manifestations.*	Percentage incidence among persons with filarial disease. Males (318 cases).	Percentage incidence among persons with filarial disease. Females (386 cases).	Cases showing microfilariae. Number.	Cases showing microfilariae. Per cent.
Lower extremities	91	99·7	17	2·5
Upper extremities	5·7	5·2	2	5·2
Filarial scrotum	0·6	..	1	50
Hydrocele	3·0	..	5	50
Lymph scrotum	0·3	..	1	100
Chyluria	0·3	..	1	100

*Such individuals as had more than one type of manifestation have been shown in more than one place.

Seven thousand four hundred and two persons covering 6·3 per cent of the population were examined during the survey. External manifestations of filarial disease were encountered among 704 (9·5 per cent) while 1,112 persons (15·0 per cent) showed microfilariæ in their blood. The species of microfilariæ encountered during the survey was *W. bancrofti* only. The disease rate varied from 4·7 to 17 per cent while the infection rate was as low as 6·7 per cent in ward 13 and as high as 20·7 per cent in ward 8. The filarial endemicity rates in the different wards varied from 13·4 to 37·5 per cent; the gross filarial endemicity rate for the town was 24·2 per cent (Table III).

The incidence of filarial disease and infection in the different age groups of the two sexes is presented in Table III. The occurrence of elephantoid conditions appears to show a steady increase with age, this being more marked in females. The microfilariæ rate shows a positive correlation with age in the earlier age groups 12 to 20 years), but beyond 20 years this index remains more or less steady without any appreciable rise.

The youngest age at which filarial infection was detected in the night blood was two years, while disease manifestations were observed in a child of five years—a case of swelling of the left leg of about six months' duration.

The types of filarial manifestations recorded during the survey consisted of elephantoid swellings of the extremities, hydrocele, filarial scrotum and one case each of lymph scrotum and chuluria (Table IV). The disease rate would appear to be high (11·6 per cent) among females as compared to that (7·8 per cent) among males. This difference, however, is not statistically significant.

Concomitant occurrence of microfilariæmia was the least among those with swellings of extremities while both the cases lymph scrotum and chuluria showed microfilariae ni their blood at night; in the latter case the centrifuged deposit of the chylous urine passed in the morning also showed microfilariæ. Fifty per cent of the persons with hydrocele (ten cases) and filarial scrotum (two cases) showed circulating microfilariæ in their blood at night.

The density of microfilarial infestation in the positive persons was determined by enumerating the parasites in positive slides. The quantity of blood taken, though not measured every time, remained approximately the same in all smears and was about 20 c.mm. Whatever error there might have been in the sampling, it remained constant and negligible as the smears were collected by the same set of workers. Wide variations were noticed in the counts which ranged from 1 to 1,278 per smear. The average microfilarial infestation rate per 20 c.mm. of positive blood was 40·3 in the community examined (Table II).

Entomological survey.—Regular collections from all wards were made during the period for adult mosquitoes which were dissected for determining the vector (S) of filarial infection in Mangalore. The resting places searched included human dwellings, cattle-sheds, a few mixed dwellings and out-door shelters.

The following species of mosquitoes were recorded during the period :—

C.fatigans,
C.sitiens,
C.(Ficalbia) minima,
C.(Lophoceratomyia) sp.,
Armegeres obturbans,
Ædes (Stegomyia) ægypti,
Anopheles barbirostris,
Anopheles jamesi,
Anopheles subpictus,
Anopheles vagus, and
Mansonia (Mansonioides) sp. (one male specimen was collected).

The females were dissected on the same day they were collected and developmental

stages of microfilariæ were looked for in the abdomen, thorax and head/proboscis. Three thousand six hundred and forty-six specimens of different species of anophelines and culicines were dissected and the results are presented in Table V.

Developmental stages of microfilariæ were found only in C.fatigans. Of 3,387 specimens of this species dissected, 471 were found to be infected, giving an infection rate of 13·9 per cent; 223 showed infections in abdomen, 358 in thorax and 44 in head. The infection rates during the three months, showed slight variation, being 12·1, 15·1 and 17·6 during the months of March, April and May respectively.

TABLE V.—*Mosquito dissections in Mangalore (March-April* 1954).

Mosquito dissection. Species. (1)	Other details. (2)	March. (3)	April. (4)	May. (5)
Culex fatigans	Number dissected	1,784	1,064	539
	Number positive	215	161	95
	Abdomen	85	85	53
	Thorax	166	119	73
	Head	35	7	2
	Infection rate	12·1 (per cent.)	15·1 (per cent.)	17.6 (per cent.)
Other culicines	Number dissected	68	9	3
	Number positive	Nil	Nil	Nil
Anophelines	Number dissected	155	16	8
	Number positive	Nil	Nil	Nil

Breeding places of Vector.

An intensive survey of the different parts of the town revealed breeding of *C. fatigans* in the following types of water collections :—

(*a*) *Domestic cess pools.*—There is no planned drainage and the waste water from houses either remains stagnating in cess pools which are kutcha in most cases or is led on to water a coconut palm in the neighbourhood. Such collections are sources of prolific breeding of *C.fatigans.*

(*b*) *Stagnant pools in drains.*—Pucca drains are few and far between, and even these are badly maintained in most places. The gradient is poor, and water either remains stagnating to form a chain of small collections or flows very sluggishly. These are perennial breeding places of the vector mosquito.

(*c*) *Tanks, disused wells and ponds.*—There are a number of tanks in the municipality, some of them attached to temples and mosques and some for pisiculture. The latter were almost dry during the time they were visited, and shallow stagnating pools in their bed showed heavy breeding of both anophelines and culicines. A few neglected wells adjoining some factories and the ponds in the coconut groves, also showed breeding. Many of the ponds and some of the tanks had heavy growth of *Pistia stratiotes* but no breeding of *Mansonoides sp.* was noticed.

(*d*) Apart from those enumerated above, a large number of potential breeding places exist in the municipality; the numerous depressions in undulating areas in the northern and north-western parts of the town are likely to become formidable sources of mosquito nuisance after the monsoons.

Discussion.

Filariasis is prevalent throughout the municipality of Mangalore, though the intensity varies in the different localities. Iyengar (1933) observed a centripetal distribution

of Bancroftian filariasis in Trivandrum, with endemicity rates over 25 per cent in the central areas, while in the peripheral parts of the town the endemicity rate was below four per cent. No such spatial distribution, however, is present in Mangalore as revealed by the present survey. High rates in the peripheral wards as also low rates in the central wards, are equally common.

A high degree of positive correlation between microfilarial infection rates and the filarial disease rates was reported by Iyengar (loc.cit.) In the present studies a similar correlation has been observed in most wards.

The disease rate, low in the younger age groups, shows a progressive increase with age, this being comparatively more marked during the first two decades (Table III). The incidence of disease appears to be comparatively higher among females than among males at all age groups. This variation, however, is not statistically significant.

The microfilaria rate, like the disease rate, shows a sharp rise up to the age of 20 years, but beyond that age, remains constant between 20 and 25 per cent, while the disease rate continues to show an upward trend. An analysis of those individuals with evidence of filariasis, i.e., having filarial disease and/or microfilariæmia shows that the disease rate increases while the microfilaria rate declines with advancing age. Iyengar (loc.cit) made similar observations in his studies in Trivandrum and explained the decrease in the microfilaria rate in higher age groups as due to the onset of filarial disease. It is likely, as has been observed by Pandit et al (1929), that certain elements present in the sera of persons with elephantoid swellings tend to bring about a reduction in the microfilariæ. This observation is supported by the fact that among the 704 persons with external manifestations of filariasis examined in Mangalore, only 26 persons (3·7 per cent) showed circulating microfilariæ in their blood (Table VI).

Even among the symptomless persons, the filarial infection and infestation rates are lower among the older age groups. Iyengar (1938) pointed out that in the absence of any immunity one should normally expect both these indices to be higher in the older residents, who have been exposed to the infection for a larger number of years. Very little is known about immunity in filarial infections. It is likely that the lowering of infection and infestation rates in the older age groups is a result of long residence in the area, and exposure to repeated small doses of infection conferring a certain degree of tolerance.

TABLE VI.—*Incidence of Filarial infection in persons with disease and those without disease.*

Group.	Number. examined.	Number showing microfilariæ.	Infection rate per cent.
Persons with filarial disease	704	26	3·7
Persons without filarial disease	6,698	1,086	16·2

The youngest age, as stated above, at which microfilariæ were observed in the night blood was in a child of two years, while disease manifestations were evident at the age of five years. During his survey of Trivandrum, Iyengar (1933) observed the occurrence of microfilaria in a child of about two years while disease manifestations were not in evidence earlier than eight years. Acton and Rao (1930) analysed the data on filarial endemicity from different parts of India and concluded that the site of lymphatic obstruction varied with the intensity of transmission under which the community

was living. In areas where conditions favoured transmission of filariasis through a greater part of the year, the degree of endemicity was high and the age incidence of disease was low, from six to ten years. The predominant lesions in such areas were elephantoid swellings of extremities.

From the latter observations of Acton and Rao (loc.cit), the available evidence that over 95 per cent of the external manifestations in Mangalore consisted of elephantiasis of the extremities, would appear to point to a prolonged transmission period in this town, probably during most months of the year. No direct evidence regarding the transmission period of filariasis in Mangalore is available: the present observations having been restricted to only three months.

Summary.

1. Observations recorded during March-April 1954, on the incidence of filariasis in Mangalore have been reported.

2. The gross disease rate for the town was 9.5 per cent and the microfilariae rate was 15 per cent. The filarial endemiety rate in the town was 24.2 per cent.

3. An average microfilarial intestaious of 40.3 per 20 c.mm. was recorded; the highest density of microfilaria enumerated being 1,278.

4. The youngest age at which microfilariæ were found in the night blood was in a child aged two years, while filarial swelling of the leg was noticed at the age of five years.

5. The disease manifestations of filariasis observed in Mangalore, were swellings of extremities, filarial scrotum, hydrocele, lymph scrotum and chuluria.

6. *W. Bancrofti* was the only species of microfilariæ recorded and natural infections were observed only in C.fatigans.

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